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No. _____

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IN THE
Supreme Court of the United States

OCTOBER TERM, 1996

GENERAL ELECTRIC COMPANY,
WESTINGHOUSE ELECTRIC CORPORATION,
and MONSANTO COMPANY,
v. *Petitioners,*

ROBERT K. JOINER and KAREN P. JOINER,
Respondents.

Petition for a Writ of Certiorari to the
United States Court of Appeals
for the Eleventh Circuit

PETITION FOR A WRIT OF CERTIORARI

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QUESTION PRESENTED

What is the standard of appellate review for trial court decisions excluding expert testimony under *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993)?

LIST PURSUANT TO RULE 29.6

Petitioner General Electric Company is a publicly held New York corporation with no parent companies. Its subsidiaries, other than wholly owned subsidiaries and subsidiaries whose shares or debt securities are not publicly held, are General Electric Capital Corporation; General Electric Credit International, N.V.; Montgomery Ward & Company, Inc.; Credit de l'Est; Finax FS AB; Finax KK AB; GE Capital Aviation Services, Ltd.; GE Capital Mortgage Services, Inc.; GE Capital (NZ) Ltd.; GE Capital PTY Ltd.; Outlet Broadcasting, Inc.; CAMCO, Inc. (Canada); General Electric Capital Services, Inc.; GECC Financial Corporation (Hawaii); General Electric Capital Canada, Inc.; GNA Corporation; Mercur Bank (Austria); Imaging Financial Services, Inc.; Gate Finance Corporation; International GE Capital Corporation; and Service Bank GmbH.

Petitioner Westinghouse Electric Corporation is a publicly held Pennsylvania corporation with no parent companies. Its subsidiaries other than wholly owned subsidiaries are Aeg-Beteiligungsgesellschaft MbH; Aeg-Westinghouse Transport-Systems Gebb; Aws Ansaldo, Spa; C & K Software, Ltd.; Computerized and Advanced Technologies Company; Contadoras Electric S.A.; Escorts, Ltd.; Greenfield Environmental; Hellenia Business Development; Infrared Fiber Systems Inc.; Jafco-Ltd. Partnership; Lor-West, Ltd.; Micros Systems, Inc.; Powerex, Inc.; Remotec, Inc.; Siam Toracato de Tella, Ltd.; Turbinas Y Generadores Turgencia C.A.; Vektron S.A.; W.S. Industries (India) Ltd.; Wb Bottling Corporation; and Westinghouse Surveillance Systems Limited.

Petitioner Monsanto Company is a publicly held Delaware corporation with no parent companies. It has no subsidiaries other than wholly owned subsidiaries.

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Petition for a Writ of Certiorari to the
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PETITION FOR A WRIT OF CERTIORARI

Petitioners pray that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Eleventh Circuit entered in this case March 27, 1996.

OPINIONS BELOW

The opinion of the District Court is reported at 864 F. Supp. 1310 and is reproduced in the Appendix at A. 34a. The opinion of the Court of Appeals is reported at 78 F.3d 524 and is reproduced at A. 1a. The orders of the Court of Appeals denying rehearing and rehearing *en banc* are unreported and are reproduced at A. 31a, 32a.

JURISDICTION

The judgment of the District Court was entered September 16, 1994. A. 69a. The judgment of the Court of Appeals was entered March 27, 1996. A. 1a. A timely petition for rehearing was denied June 11, 1996. A. 31a. This Court has jurisdiction pursuant to 28 U.S.C. § 1254(1).

RULES INVOLVED

Rules 104, 702 and 706 of the Federal Rules of Evidence are reproduced at A. 70a.

STATEMENT

Respondents, an electrician and his wife, sued petitioners in a Georgia court claiming that his lung cancer had been "promoted" (he had smoked for eight years) by exposure to PCBs, furans and dioxins in transformers manufactured by petitioners General Electric and Westinghouse. The suit was removed to the United States District Court for the Northern District of Georgia. The District Court under Rule 702, Fed. R. Evid., excluded expert testimony proffered by respondents and granted petitioners' motion for summary judgment. The Eleventh Circuit reversed.

A. The District Court's Ruling.

The District Court held that respondents had failed to produce admissible scientific evidence that PCBs could cause respondent's small-cell lung cancer, nor that respondent had been exposed to furans or dioxins. In so holding, the court acting under Rules 104(a) and 702 of the Federal Rules of Evidence, and citing this Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), excluded proffered testimony from two experts presented by respondents. The District Court held that evidence of causation in human beings was lacking, and that although in certain instances scientists may

use some kinds of animal studies as an indication of causation of a particular human disease, in this case such support was absent because there were only two studies, they used massive doses, and their findings were only preliminary. A. 61a. As for epidemiological data, "the studies simply do not support the experts' position that PCBs *more probably than not* promoted Joiner's lung cancer." A. 67a (emphasis in original). After reviewing in detail the methodology cited for the opinions, the District Court concluded that although there was scientific basis for opining there had been exposure to PCBs (but not furans or dioxins), the experts had presented no support in science for claiming causation:

"The court is persuaded that the opinions of Plaintiffs' experts do not rise above 'subjective belief or unsupported speculation.'"

A. 67a, quoting *Daubert, supra*, 509 U.S. at 590.

B. The Court of Appeals' Reversal.

Splitting 2-1 and issuing three opinions, the Court of Appeals for the Eleventh Circuit reversed. The judges disagreed as to the proper standard and nature of appellate review of district court rulings under *Daubert*.

Judge Barkett, writing for the majority, held that although ordinarily district court rulings on admissibility are "reviewed for abuse of discretion," A. 4a, nevertheless "we apply a particularly stringent standard of review to the trial judge's exclusion of expert testimony." *Id.* The opinion cited as authority for this "stringent" review the Third Circuit's opinion in *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 750 (3d Cir. 1994), cert. denied sub nom. *General Elec. Co. v. Ingram*, 115 S. Ct. 1253 (1995). A. 5a. Using this "particularly stringent standard of review," the majority after its own examination of the opinions of two experts disagreed with the District Court's ruling, holding that "we find that the

district court improperly assessed the admissibility of the proffered scientific expert testimony” A. 2a. The majority opinion held that instead of examining whether there was support in science for each link in the reasoning leading to the experts’ conclusions, the District Court should have accepted the conclusions “viewed in their entirety.” A. 12. Reexamining the entire record, including materials not cited by any party in the District Court, A. 16a, the Court of Appeals held that “the testimony of plaintiffs’ experts was erroneously excluded,” and reversed. *Id.*

Judge Birch concurred specially, suggesting that a trial judge should “enhance the record for appellate review by appointing an expert, under Fed.R.Evid. 706, to assist the court in evaluating proffered scientific evidence,” because “the need for the trial court generalist to seek expertise in discharging *Daubert* responsibilities becomes increasing[ly] evident and compelling.” A. 17a.

Judge Smith, of the Federal Circuit, dissented, disagreeing with the majority’s holding as to the standard of appellate review. Citing many decisions from other Circuits, he concluded that “[i]n applying the *Daubert* framework, the trial court’s ruling . . . is reviewed for abuse of discretion.” A. 20a (footnote omitted). “Those circuits addressing *Daubert*,” he said, give “deference to the trial court’s admissibility determinations.” A. 20a n.1 (collecting cases). Because under *Daubert* “the trial court ‘gatekeeper’ has broad discretion,” A. 18a, “we should not require the trier of fact to accept blindly the expert’s word to fill the analytical gap between proffered ‘scientific knowledge’ and the expert’s conclusion.” *Id.* Approving “the trial court’s step-by-step approach,” A. 30, the dissent objected that in reversing the District Court “the majority errs by first applying the reliability prong of *Daubert* to the experts’ opinions as a whole.” A. 21a; see also A. 30a.

“[S]ifting through the expert’s testimony is a crucial ‘gatekeeping’ function that not only requires the trial

court to decide which experts may testify, but also requires the trial court to decide what the experts may testify about (i.e., the trial court must separate the wheat from the chaff). . . . [A]n expert may not bombard the court with innumerable studies and then, with smoke and sleight of hand, leap to the conclusion.

* * * *

“ . . . [I]f the trial court finds the expert testimony requires too great a leap of faith across the analytical gap, it may properly request good grounds to bridge the gap before admitting the testimony. . . . This is not too onerous a request”

A. 22a, 27a.¹ Giving “deference to the trial court’s admissibility determinations,” A. 20 n.1, the dissent concluded that

“The trial court properly applied *Daubert* and did not abuse its discretion in ruling certain expert testimony inadmissible.”

A. 29a-30a. Rehearing and rehearing *en banc* were denied. A. 31a, 32a.

REASONS FOR GRANTING THE WRIT

One more Circuit here has taken a position on the unavoidable question left unanswered by this Court’s decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). That question is, what is the standard of review to be applied by the courts of appeals when reviewing a district court’s exclusion of proffered expert testimony under Rule 702 of the Federal Rules of

¹ The dissent pointed out that, for example, “the trial court’s ruling was not that animal studies are inadmissible *per se*, but that Mr. Joiner’s general response that experts generally rely on animal studies fails to show the reliability and ‘fit’ of these particular animal studies,” A. 25a, and “Mr. Joiner completely failed to respond to the trial court’s concerns,” A. 28a. The dissent also criticized the majority for reversing based on its own interpretation of portions of the record that had not been argued by the plaintiffs to the trial court. A. 22a-23a.

Evidence? Twelve Circuits now are split among three different answers, with ten Circuits according trial courts wide discretion and two holding the opposite.

The issue of standard of review is fundamental and surely will have to be resolved by this Court. It is difficult to see any reason why the time for review has not now come, particularly when the disparity of review standards among the Circuits means that judgments are being reversed in some Circuits that would be affirmed in others.

I. THE CIRCUITS ARE COMPLETELY SPLIT.

In 1994, two of these petitioners asked this Court to grant certiorari to resolve the split in the Circuits as to the proper standard of appellate review for *Daubert* rulings. Petition for Certiorari, *General Elec. Co. v. Ingram*, No. 94-1070, OT 1994. That petition pointed out that as of December 1994, eleven of the thirteen Circuits had addressed the question and had split in three different directions. *Id.* at 12-15. The Eleventh Circuit, the petition noted, was one of the two Circuits still to be heard from. *Id.* at 12 n.11. Now it has been, and has adopted the extreme rule theretofore followed only by the Third Circuit: that *Daubert* exclusions are to receive "a particularly stringent standard of review." A. 4a.

This Court early in 1995 denied that first petition for certiorari that asked to resolve the split over the proper *Daubert* standard of review. *General Elec. Co. v. Ingram*, 115 S. Ct. 1253 (1995). Since that time the Circuits have remained divided among three views. Now all except the Federal Circuit have been heard from.

To summarize the varying positions: (1) One group of courts of appeals (six of them) reverses *Daubert* rulings only if "manifestly erroneous." (2) A second group (four others) applies an "abuse of discretion" standard of review, while emphasizing the deference accorded trial court evidentiary rulings. (3) A minority of two,

illustrated by the decision here, are not deferential and instead apply a "particularly stringent standard of review," A. 4a, called by the Third Circuit a "hard look" and "more stringent review." *In re Paoli R.R. Yard PCB Litigation*, *supra*, 35 F.3d at 749-50. Recent representative decisions are:

A. The "Manifestly Erroneous" Standard.

Six Circuits in *Daubert* appeals follow the "manifestly erroneous" standard of review that was prescribed by this Court for rulings on admissibility of expert testimony in *Salem v. United States Lines Co.*, 370 U.S. 31, 35 (1962).

Seventh Circuit.—Thus the Seventh Circuit holds that under *Daubert* "we will not disturb the district court's findings unless they are manifestly erroneous." *Bradley v. Brown*, 42 F.3d 434, 436-37 (7th Cir. 1994).

"In reviewing the district court's fact-specific application of the approach mandated by *Daubert*, we must apply a deferential standard of review. A 'decision to allow expert testimony is within the broad discretion of the trial judge and 'is to be sustained on appeal unless manifestly erroneous.'" *Bradley v. Brown*, 42 F.3d 434, 437 (7th Cir. 1994) (quoting *United States v. Daccarett*, 6 F.3d 37, 58 (2d Cir. 1993) (citation omitted), *cert. denied* [*sub nom. Creaciones Viviana Ltda. v. United States*], 114 S. Ct. 1294, 1295, 1538 (1994)"

Deimer v. Cincinnati Sub-Zero Prods., Inc., 58 F.3d 341, 344 (7th Cir. 1995).

Second Circuit.—"A decision to allow expert testimony is within the broad discretion of the trial judge and 'is to be sustained on appeal unless manifestly erroneous.'" *United States v. Daccarett*, *supra*, 6 F.3d at 58, quoting *United States v. Brown*, 776 F.2d 397, 400 (2d Cir. 1985), *cert. denied*, 475 U.S. 1141 (1986). *Accord*,

McCulloch v. H.B. Fuller Co., 61 F.3d 1038, 1042 (2d Cir. 1995) ("left to the broad discretion of the trial judge and will be overturned only when manifestly erroneous"); *United States v. Amuso*, 21 F.3d 1251, 1263 (2d Cir.), *cert. denied*, 115 S. Ct. 326 (1994); *United States v. Locascio*, 6 F.3d 924, 936 (2d Cir. 1993), *cert. denied sub nom. Gotti v. United States*, 114 S. Ct. 1646 (1994).

Ninth Circuit.—"We review *de novo* the district court's interpretation of the Federal Rules of Evidence and will uphold its decision to exclude expert testimony unless it is 'manifestly erroneous.'" *Claar v. Burlington N.R.R.*, 29 F.3d 499, 500-01 (9th Cir. 1994), quoting *Rogers v. Raymark Industries, Inc.*, 922 F.2d 1426, 1429 (9th Cir. 1991). *Accord*, *United States v. Rincon*, 28 F.3d 921, 923 (9th Cir.) *cert. denied*, 115 S. Ct. 605 (1994). See also *Lust v. Merrell Dow Pharmaceuticals, Inc.*, 1996 U.S. App. Lexis 16690, *5 (9th Cir. 1996) ("[t]he abuse of discretion standard applies to an F.R.E. 702 ruling even though the ruling was dispositive of a motion for summary judgment").

First Circuit.—"Because gauging an expert witness's usefulness is almost always a case-specific inquiry . . . a trial judge's rulings in this sphere should be upheld 'unless manifestly erroneous.'" *United States v. Sepulveda*, 15 F.3d 1161, 1183 (1st Cir. 1993), quoting in part *Salem v. United States Lines Co.*, *supra*, 370 U.S. at 35. See also *United States v. Shay*, 57 F.3d 126, 132 (1st Cir. 1995) ("district court's decision to admit or exclude expert testimony is entitled to great deference").

Fifth Circuit.—"The Fifth Circuit holds that under *Daubert* 'a trial court is accorded a wide berth to determine the admissibility of expert testimony.'" *United States v. 14.38 Acres*, 80 F.3d 1074, 1077 (5th Cir. 1996). "A trial court's ruling regarding admissibility of expert testimony is protected by an ambit of discretion and must be sustained unless manifestly erroneous." *Rosado v. Deters*, 5 F.3d 119, 124 (5th Cir. 1993), quoting *Christopher-*

sen v. Allied-Signal Corp., 939 F.2d 1106, 1109 (5th Cir. 1991), *cert. denied*, 503 U.S. 912 (1992). See also *Pedraza v. Jones*, 71 F.3d 194, 197 (5th Cir. 1995) ("district court did not abuse its discretion in refusing to consider the affidavit as expert testimony"); *Elland v. Westinghouse Elec. Corp.*, 58 F.3d 176, 180 (5th Cir. 1995) ("manifestly erroneous").

Sixth Circuit.—"The Sixth Circuit holds that in applying *Daubert* 'A trial court 'has broad discretion in the matter of the admission or exclusion of expert evidence, and [the court's] action is to be sustained unless manifestly erroneous.'" *American & Foreign Ins. Co. v. General Elec. Co.*, 45 F.3d 135, 137 (6th Cir. 1995), quoting *Salem v. United States Lines Co.*, *supra*, 370 U.S. at 35. *Accord*, *United States v. Bonds*, 12 F.3d 540, 554 (6th Cir. 1993) ("the trial court's actions are to be sustained 'unless manifestly erroneous'"), quoting *United States v. Green*, 548 F.2d 1261, 1268 (6th Cir. 1977). See also *Cook v. American S.S. Co.*, 53 F.3d 733, 738 (6th Cir. 1995) (referring to Rule 702 application as "a determination of relevance, which this court reviews for abuse of discretion").

B. The Deferential "Abuse of Discretion" Standard.

Without using the phrase "manifestly erroneous," four Circuits review for abuse of discretion, while emphasizing the deference to be accorded the trial judge's rulings.

Fourth Circuit.—"The Fourth Circuit holds that 'under the *Daubert* analysis a trial judge has a great deal of discretion in deciding whether to admit or exclude expert testimony' and a 'deferential standard for reviewing evidentiary determinations' is applied. *United States v. Dorsey*, 45 F.3d 809, 813 (4th Cir.) *cert. denied*, 115 S. Ct. 2631 (1995). *Accord*, *United States v. Powers*, 59 F.3d 1460, 1471 (4th Cir. 1995), *cert. denied*, 116 S. Ct. 784 (1996); *United States v. Bynum*, 3 F.3d 769, 773 (4th Cir. 1993), *cert. denied*, 114 S. Ct. 1105 (1994).

Eighth Circuit.—The Eighth Circuit holds that district court exclusions of expert testimony under *Daubert* will be affirmed unless there was “a clear abuse of discretion.” *Gier v. Educational Service Unit*, 66 F.3d 940, 944 (8th Cir. 1995). *Accord*, *Ventura v. Titan Sports, Inc.*, 65 F.3d 725, 735 (8th Cir. 1995), *cert. denied*, 116 S. Ct. 1268 (1996); *Watkins v. Schriver*, 52 F.3d 769, 771 (8th Cir. 1995) (“[t]he district court’s ruling as to the exclusion of such testimony will be reversed only for an abuse of discretion”).

Tenth Circuit.—The Tenth Circuit holds that a district court’s admissibility rulings under *Daubert* “will be disturbed only for a clear abuse of discretion.” *United States v. Davis*, 40 F.3d 1069 (10th Cir. 1994), *cert. denied*, 115 S. Ct. 1387 and 1806 (1995). *Accord*, *Kieffer v. Weston Land, Inc.*, 1996 U.S. App. Lexis 18191 (10th Cir. 1996); *United States v. Markum*, 4 F.3d 891, 895 (10th Cir. 1993).

District of Columbia Circuit.—The District of Columbia Circuit also applies an “abuse of discretion” standard in reviewing *Daubert* rulings, emphasizing that trial judges are to be allowed “broad discretion.” *Joy v. Bell Helicopter Textron, Inc.*, 999 F.2d 549, 567 (D.C. Cir. 1993).

C. “Stringent” Non-Deferential Review.

The Eleventh and Third Circuits have adopted quite a different standard of review.

Third Circuit.—The Third Circuit uses a “heightened abuse of discretion review” that applies “a hard look at (more stringent review of) the district court’s exercise of discretion” when expert testimony is excluded under *Daubert*. *In re Paoli R.R. Yard PCB Litigation, supra*, 35 F.3d at 749-50. Examining the Third Circuit’s standard, Judge Wiseman wrote:

“This creation of a new and higher standard of review appears to be without authority or precedent.

It has not been followed by any other circuit as of this writing.”

Wiseman, *Judging the Expert*, 55 OHIO ST. L.J. 1105, 1112 (1994).²

Eleventh Circuit.—But now it has been. The Eleventh Circuit in the present case, relying on the Third Circuit’s *Paoli* decision, now has also adopted the “particularly stringent,” A. 4a, non-deferential test that is at variance with the law in the other Circuits.

II. THE DECISION IS IN CONFLICT WITH DECISIONS OF THIS COURT.

In *Salem v. United States Lines Co.*, 370 U.S. 31, 35 (1962), this Court held that

“the trial judge has broad discretion in the matter of the admission or exclusion of expert evidence, and his action is to be sustained unless manifestly erroneous.”

In reiterating that standard of review, *Salem* cited and relied on language to the same effect in *Spring Co. v. Edgar*, 99 U.S. 645, 658 (1879) (in evidentiary rulings “the appellate court will not reverse in such a case, unless the ruling is manifestly erroneous”).

Nothing in *Daubert* or the Federal Rules of Evidence gives the slightest hint that that standard of appellate review long established by this Court was changed to narrow district courts’ discretion. *Daubert*, indeed, emphasized the “gatekeeping role,” 509 U.S. at 597, that trial courts are expected to perform in deciding whether

² Before the present decision, another commentator observed that “*Paoli* stands almost alone—alone but for later cases in its circuit that pick up its language—in expressing the standard of review as anything but the most lenient kind of review for abuse of discretion. The non-*Paoli* cases seem to be correct.” Fenner, *The Daubert Handbook: The Case, Its Essential Dilemma, and Its Progeny*, 29 CREIGHTON L. REV. 939, 1050 (1996) (footnote omitted).

opinions purportedly based on science are to be admitted into evidence, and underscored that "[t]he inquiry envisioned by Rule 702 is, we emphasize, a flexible one." *Id.* at 594. "[U]nder the Rules the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." *Id.* at 589.

As support for its "particularly stringent" standard of review, the Eleventh Circuit majority repeatedly assumed that this Court in *Daubert* had diminished the trial court's authority to exclude opinions invoking science. *E.g.*, A. 8a ("[k]eeping *Daubert's* lower threshold in mind"). Other courts and commentators, however, have concluded that "*Daubert* clearly requires trial judges to subject expert evidence to more penetrating pretrial scrutiny" American College of Trial Lawyers, *Standards and Procedures for Determining the Admissibility of Expert Evidence After Daubert*, 157 F.R.D. 571 (1994). See also Bernstein, *The Admissibility of Scientific Evidence After Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 15 CARDOZO L. REV. 2139 (1994) ("most federal courts are interpreting *Daubert* as giving them wide authority to restrict the scope of admissible scientific evidence in toxic tort litigation").

"The *Daubert* Court significantly changed the standards governing the admissibility of scientific evidence by expanding district courts' discretions to evaluate the reliability and relevance of contested evidence."

In re Joint Eastern & Southern Dist. Asbestos Litigation, 52 F.3d 1124, 1132 (2d Cir. 1995) (emphasis supplied). See also, *e.g.*, *Wilson v. City of Chicago*, 6 F.3d 1233, 1238-39 (7th Cir. 1993) (*Daubert* "shifted to the trial judge the responsibility for keeping 'junk science' out of the courtroom"), *cert. denied*, 114 S. Ct. 1844 (1994); *Rosen v. Ciba-Geigy Corp.*, 78 F.3d 316, 318 (7th Cir. 1996) ("the Supreme Court in *Daubert* told judges to distinguish between real and courtroom science"), *pet'n for*

cert. filed, 64 U.S.L. WEEK 3839 (U.S. June 10, 1996) (No. 95-1986).

III. THE ISSUE IS IMPORTANT.

Commentators have repeatedly pointed out that "[a]nother issue unresolved by *Daubert* concerns the standard of review of trial judges' decisions about admissibility made pursuant to *Daubert's* new, flexible inquiry." Note, *Daubert v. Merrell Dow Pharmaceuticals: Pushing the Limits of Scientific Reliability*, 47 VAND. L. REV. 1175, 1196 (1994); see also Faigman *et al.*, *Check Your Crystal Ball at the Courthouse Door, Please*, 15 CARDOZO L. REV. 1799, 1820 (1994).

"The standard of review for assessing lower courts' decisions regarding the admissibility of expert testimony remains unclear.

* * * *

"[T]he standard of review issue is not easily resolved."

Note, *Developments in the Law—Confronting the New Challenges of Scientific Evidence*, 108 HARV. L. REV. 1481, 1527, 1529 (1995). The issue not only is unresolved. It also "is important." *Mars v. United States*, 25 F.3d 1383, 1384 (7th Cir. 1994).³

This Court amended the Federal Rules of Appellate Procedure in 1993 to require that every appellate brief "must also include for each issue a concise statement of

³ Cf., *e.g.*, *Koon v. United States*, 116 S. Ct. 2035, 2043 (1996) ("We granted certiorari to determine the standard of review governing appeals from a district court's decision to depart from the sentencing ranges . . ."); *Ornelas v. United States*, 116 S. Ct. 1657, 1661 (1996) ("We granted certiorari to resolve the conflict among the Circuits over the applicable standard of appellate review"); *Wilton v. Seven Falls Co.*, 115 S. Ct. 2137, 2139 (1995) ("This case asks . . . under what standard of review a court of appeals should evaluate the district court's decision . . .").

the applicable standard of review." Fed. R. App. P. 28(a)(6). Having posed the question, this Court should not withhold the answer.⁴

CONCLUSION

For the reasons stated, certiorari should be granted.

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⁴ Once the proper standard of appellate review is decided, this Court need not itself reexamine the record. *Cf. Daubert*, 509 U.S. at 598 ("the case is remanded for further proceedings consistent with this opinion").

APPENDIX

APPENDIX A

UNITED STATES COURT OF APPEALS
ELEVENTH CIRCUIT

No. 94-9131

ROBERT K. JOINER, KAREN P. JOINER,
Plaintiffs-Appellants,

v.

GENERAL ELECTRIC COMPANY, A New York Corporation;
WESTINGHOUSE ELECTRIC CORPORATION, A Pennsyl-
vania Corporation; MONSANTO COMPANY, A Delaware
Corporation,

Defendants-Appellees.

On Appeal from the United States District Court
for the Northern District of Georgia

March 27, 1996

Before BIRCH and BARKETT, Circuit Judges, and
SMITH,* Senior Circuit Judge.

BARKETT, Circuit Judge:

Robert Joiner ("Joiner") and his wife, Karen Joiner,
brought this suit in state court on August 5, 1993, seeking

* Honorable Edward S. Smith, Senior U.S. Circuit Judge for
the Federal Circuit, sitting by designation.

damages for personal injuries from lung cancer allegedly caused by Robert Joiner's exposure to polychlorinated biphenyls ("PCBs") while working for the City of Thomasville, Georgia ("City"). Monsanto, General Electric Company, and Westinghouse Electric Corporation ("defendants") removed the action to federal district court, which excluded the testimony of the Joiners' experts and granted the defendants' motion for summary judgment, which the Joiners now appeal. Because we find that the district court improperly assessed the admissibility of the proffered scientific expert testimony and overlooked evidence establishing disputed issues of fact, we reverse the summary judgment.

Facts

Beginning in 1973, Joiner worked as an electrician in the City's Water & Light Department, a position requiring him to work with and around the City's electrical transformers. Throughout Joiner's employment, all of the City's transformers should have used as a coolant a mineral oil-based dielectric fluid which was free of PCBs.¹ However, in 1983, the City discovered PCB contamination in the dielectric fluid used in some of its transformers. From 1983 to 1993, the City conducted tests and concluded that almost one out of every five of the transformers tested presented a PCB hazard.

When a transformer was in need of repair, it was Joiner's duty to open it, drain out the dielectric fluid, bake the core of the transformer dry of dielectric fluid,² make repairs, refill the transformer with fresh mineral oil dielectric fluid, and then test the transformer. These re-

¹ In 1978 Congress banned the production and sale of PCBs because they "present an unreasonable risk of injury to health or the environment." 15 U.S.C. § 2605(a) (2) (A).

² Joiner followed a "baking out" process during which all remaining dielectric fluid that covered the core was baked off under intense heat for several days at a time, to the point of smoking, until the transformer core was dry.

pairs required that Joiner stick his hands and arms into the dielectric fluid. Joiner testified that dielectric fluid got all over him at times, that he would swallow a small amount of dielectric fluid when it splashed into his mouth, and that dielectric fluid had splashed into his eyes on several occasions.

In 1991, at the age of 37, Joiner was diagnosed with lung cancer. The Joiners' theory of the case was that while Joiner's history of cigarette smoking and his family history of lung cancer may have predisposed him to developing lung cancer,³ his exposure to PCBs and their derivatives—polychlorinated dibenzofurans ("furans") and polychlorinated dibenzodioxins ("dioxins")—served to "promote" his small cell lung cancer.⁴

Defendants moved for summary judgment on the grounds that (1) there was no admissible scientific evidence that PCBs promoted Joiner's cancer, and (2) there was no evidence that Joiner suffered significant exposure to PCBs, furans, or dioxins. The Joiners responded with the depositions and affidavits of experts who testified that PCBs alone can promote cancer and that furans and dioxins can also promote cancer, that Joiner was exposed to PCBs, furans, and dioxins, and that, in these experts' opinions, such exposure was responsible for Joiner's cancer. The district court deemed inadmissible all of the testimony presented by the Joiners' experts and granted

³ Joiner, who had smoked cigarettes for approximately eight years, stopped smoking by 1981, ten years before his doctor diagnosed his lung cancer. *Joiner v. General Elec. Co.*, 864 F.Supp. 1310, 1312 (N.D.Ga.1994). One of the Joiners' experts testified that, notwithstanding Joiner's history of smoking, "lung cancer is extremely rare for a thirty-seven year old white male in the United States." *Id.* at 1313-14.

⁴ One of the Joiners' experts explained that cancers often begin with an initiated cell which may not do harm until promoted. A "promotor" is an agent that provokes an initiated cell to turn cancerous. *Id.* at 1313.

summary judgment for the defendants.⁶ In addition, although it found Joiner was exposed to PCBs, the court asserted that there was no credible evidence that Joiner had been exposed to furans and dioxins, and granted summary judgment against the Joiners on the question of exposure to furans and dioxins. *Joiner v. General Elec. Co.*, 864 F.Supp. 1310, 1326 (N.D.Ga.1994).

On appeal, the Joiners reassert the admissibility of their expert testimony to establish causation. They also contest the district court's grant of summary judgment on the issue of Joiner's exposure to furans and dioxins.

Discussion

A. Standard of Review

We review a grant of summary judgment de novo. *Fane v. Edenfield*, 945 F.2d 1514, 1516 (11th Cir. 1991), *aff'd*, 507 U.S. 761, 113 S.Ct. 1792, 123 L.Ed.2d 543 (1993). Summary judgment is appropriate when there is no genuine issue of material fact, and the moving party is entitled to judgment as a matter of law. Fed. R. Civ.P. 56(c). The moving party bears the burden of showing that there is no issue of material fact. *Celotex Corp. v. Catrett*, 477 U.S. 317, 325, 106 S.Ct. 2548, 2553-54, 91 L.Ed.2d 265 (1986).

A district court's ruling on the admissibility of evidence is reviewed for abuse of discretion. *Ad-Vantage Tel. Directory Consultants, Inc. v. GTE Directories Corp.*, 37 F.3d 1460, 1463 (11th Cir.1994). Because the Federal Rules of Evidence governing expert testimony display a preference for admissibility, we apply a particularly stringent standard of review to the trial judge's exclusion of expert testimony. *See, e.g., Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579, —, 113 S.Ct. 2786,

⁶ The district court denied both the Joiners' and the defendants' requests for oral argument on the defendants' joint motion for summary judgment.

2794, 125 L.Ed.2d 469 (1993); *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 750 (3d Cir.1994). To the extent that the district court's ruling turns on an interpretation of a Federal Rule of Evidence, our review is plenary. *Id.* at 749.

B. The Admissibility of Expert Testimony

In 1923, *Frye v. United States* established a "general acceptance" test that guided district courts in determining when to admit scientific evidence. *Frye*, 293 F. 1013, 1014 (D.C.Cir.1923). This test required courts to exclude any novel scientific evidence not already grounded in a principle that had attained "general acceptance in the particular field" in which it belonged. *Id.*

In 1975, the Federal Rules of Evidence ("Rules") introduced a more liberal approach to the question of the admissibility of scientific evidence.⁶ Rule 702, which specifically governs expert testimony, provides:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Fed.R.Evid. 702. Notwithstanding the Rules, most courts continued to adhere to the "general acceptance" test.

In 1993, the Supreme Court in *Daubert*, 509 U.S. at —, 113 S.Ct. at 2793, specifically held that the Rules superseded the *Frye* "general acceptance" test. The Court made clear that the critical concerns of Rule 702 are evidentiary reliability and relevancy. *Daubert*, 509 U.S. at —, 113 S.Ct. at 2795. Thus, an expert's bald statement that he or she is imparting "scientific knowledge" does not

⁶ Rule 104(a) provides that the court shall determine "[p]reliminary questions concerning . . . the admissibility of evidence." Fed.R.Evid. 104(a).

automatically render that expert's opinion admissible. In order to best ensure relevant and reliable testimony and exclude "unsupported speculation," *Daubert* establishes a two-pronged test which requires a district court, before it may admit scientific testimony, to determine "whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue." *Id.* at —, 113 S.Ct. at 2796. This "gatekeeping" role calls for the trial judge to make a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid, i.e., whether it is reliable; and whether that reasoning or methodology properly can be applied to the facts in issue," i.e., whether it is relevant to the issue involved. *Id.* Proffered scientific evidence must satisfy both prongs to be admissible.

Under the first prong, evidentiary reliability, the district court must examine the reasoning or methodology underlying the expert opinion to determine whether it utilizes valid scientific methods and procedures. Trial judges must evaluate scientific processes and studies with which they may not be intimately familiar, but be careful not to cross the line between deciding whether the expert's testimony is based on "scientifically valid principles" and deciding upon the correctness of the expert's conclusions. The latter inquiry is for the jury and, therefore, judges may not implicitly factor it into their assessment of reliability.

Daubert suggests several factors to aid federal judges in evaluating whether a particular scientific theory or study is reliable: (1) its empirical testability; (2) whether the theory or study has been published or subjected to peer review; (3) whether the known or potential rate of error is acceptable; and (4) whether the method is generally accepted in the scientific community. *Id.* at —, 113 S.Ct. at 2797-98. These factors are neither exhaustive nor applicable in every case. *See also Paoli*, 35 F.3d

at 742. Where appropriate, they serve as indicia of the reliability of the basis of an expert's testimony.

Under the second prong, relevance, the district court must determine whether the methodology or reasoning underlying the expert opinion relates to the issue at hand, i.e., whether it assists the trier of fact in understanding the evidence or a fact in issue. *Daubert*, 509 U.S. at —, 113 S.Ct. at 2795. In this regard, the *Daubert* Court discusses the concept of "fitness," that is, "whether expert testimony proffered in the case is sufficiently tied to the facts of the case that it will aid the jury in resolving a factual dispute." *Id.* at —, 113 S.Ct. at 2795-96 (quoting *United States v. Downing*, 753 F.2d 1224, 1242 (3d Cir.1985)).

In analyzing the admissibility of expert testimony, it is important for trial courts to keep in mind the separate functions of judge and jury, and the intent of *Daubert* to loosen the strictures of *Frye* and make it easier to present legitimate conflicting views of experts for the jury's consideration. *Frye* required that before an expert could testify, the proffered opinion had to be generally accepted in the pertinent field. The necessity for such broad acceptance as a condition for admissibility was eliminated by Rule 702. The admission of scientific evidence that might not yet be generally accepted in the field, however, is contingent on a trial court's finding that such evidence is indeed scientifically legitimate, and not "junk science" or mere speculation. This gatekeeping role is simply to guard the jury from considering as proof pure speculation presented in the guise of legitimate scientifically-based expert opinion. It is not intended to turn judges into jurors or surrogate scientists. Thus, the gatekeeping responsibility of the trial courts is not to weigh or choose between conflicting scientific opinions, or to analyze and study the science in question in order to reach its own scientific conclusions from the material in the field. Rather, it is to assure that an expert's opinions are based

on relevant scientific methods, processes, and data, and not on mere speculation, and that they apply to the facts in issue. Keeping *Daubert's* lower threshold in mind, we turn to the facts of this case.

1. *Application of Daubert to this Case—Reliability*

Under the first prong of *Daubert*, the district court must identify the basis of an expert's testimony and ascertain whether the methods, procedures, and information used by the expert to reach his or her conclusion are scientifically reliable.

a. *The Basis of an Expert's Opinions*

The Joiners' chief experts were Daniel T. Teitelbaum, M.D., and Arnold Schecter, M.D., M.P.H. The record reflects that each opinion proffered by the Joiners' experts as scientific knowledge was supported by the respective experts' specialized education, years of experience, physical examination of Joiner, and familiarity with the general scientific literature in the field, as well as by reliance upon specific scientific studies relating to the carcinogenic effect of PCBs.⁷ According to their curriculum vitae, each appears to have a national reputation, and the district court qualified them as experts.⁸ Both experts familiarized them-

⁷ Although we consider the admissibility of each expert's testimony separately, we do see similar factors supporting the admission of both experts' testimony, and for convenience we often refer to them collectively.

⁸ The evidence indicated that Teitelbaum is co-founder of the American Academy of Clinical Toxicology and the American Board of Medical Toxicology. He has published more than 40 articles in his field and teaches numerous graduate level courses in occupational and environmental toxicology and the epidemiology of toxic diseases. He is also a practicing toxicologist and has repeated experience treating patients from the electrical trades. Additionally, he has lectured on medical toxicology/epidemiology for federal judges.

Schecter is professor of preventative medicine at State University of New York, Binghamton, and works full time researching the

selves with the specifics of Joiner's history and disease, and reviewed the medical literature they deemed pertinent. Teitelbaum, through his affidavit and deposition testimony, set forth the general methodology he utilized in arriving at his expert opinion:

[I conducted] a comprehensive and traditional occupational medical assessment of Mr. Joiner. . . . As part of this assessment I interviewed and examined him . . . for several hours. In addition, I reviewed his past medical records, the data which was available about his workplace and materials with which he worked, depositions of Mr. Joiner, and others, and depositions of family members and co-workers about the nature of his work. I also considered many other documents relevant to the questions which I was asked concerning Mr. Joiner's illness and its relationship to his occupational exposures to toxic substances. . . . I utilized traditional medical assessment techniques. I also relied upon my extensive experience with workers in the electrical trades and my knowledge of the toxicology of the materials with which Mr. Joiner worked. I considered the fundamental mechanisms of toxicology and carcinogenesis as a manifestation of toxic outcome, the biology of cancer including the biology of small cell lung cancer, and the state of the art regarding the testing and evaluation of toxic substances for carcinogenic risk in humans.

Schecter also interviewed Joiner and reviewed his deposition and affidavit testimony. He conducted a review of Joiner's medical records, a videotape of the working conditions involving Joiner's repair of electrical transformers,

health effects of various toxic substances encountered in the workplace. He has published over 100 articles and abstracts subjected to peer review on the effects of workplace exposure to toxic chemicals, and has served on the editorial boards of numerous scientific and medical journals.

the results of PCB testing done on the transformers, the relevant scientific literature on the toxic effects of the substances contained in defendants' products, and all deposed expert testimony. In arriving at his opinion, Schechter claimed to have eliminated other potential causes of Joiner's lung cancer to a reasonable degree of medical certainty.

In addition, each doctor utilized numerous scientific studies and authorities. Although the district court apparently considered only four epidemiological studies and two animal studies, Teitelbaum referred to several additional studies which he utilized in forming his views. Among those not mentioned by the district court were studies by researchers Gustavsson and Hogsted, findings of the International Program on Chemical Safety ("IPCS") World Health Organization Criterion, and "a whole series of [epidemiological studies] listed in [the World Health Organization] document."

Similarly, in addition to the studies mentioned in the district court's opinion, Schechter relied, in part, upon "recent work such as that of Dr. George Lucier and colleagues at the National Institute of Health," "IARC studies, International Agency on Cancer at the World Health Organization," studies by "Dr. James Huff of the National Institute of Health," the Zober and Theiss studies from Germany, and also "Manz['] study on European workers."

b. *Were the Methods and Procedures Underlying the Experts' Testimony Reliable?*

Likewise, the record reflects that Teitelbaum and Schechter each utilized scientifically reliable methods and procedures in gathering and assimilating all of the relevant information in forming their respective opinions. Teitelbaum stated that his methodology "has been the basis of diagnosis for hundreds of years." Schechter described his methodology as one "usually and generally followed by

physicians and scientists." Each asserted the general acceptance of the procedures they employed and defendants do not challenge these claims.

Furthermore, the extensive experience and specialized expertise of each of these experts augment the reliability of their reasoning and methodology. While this factor is most pertinent in deciding the separate question of whether the experts are qualified to testify, *see* Fed.R.Evid. 702, it also has some bearing on the determination of the reliability of the underlying reasoning or methodology. *Hopkins v. Dow Corning Corp.*, 33 F.3d 1116, 1125 (9th Cir.1994) (considering "expertise" to conclude that methodology underlying expert opinions satisfied *Daubert*); *Downing*, 753 F.2d at 1239 (recognizing that "[t]he qualifications and professional stature of expert witnesses . . . may also constitute circumstantial evidence of the reliability of the technique").

The assessment of reliability also involves reviewing the basis for an expert's opinion. As previously noted, when an expert relies on specific research to form an opinion, the district court must ascertain whether such research is reliable. To accomplish this, the court examines whatever evidence is proffered supporting or criticizing the research, keeping in mind the purpose of the inquiry, i.e., to exclude opinions based on mere speculation. While this inquiry cannot be made without some consideration of the quality of the research in question, the district court's focus is a narrow one and does not encompass deciding which expert's conclusions are better reasoned or more appealing. Nor should the court make independent scientific judgments on the basis of individual studies. For example, the court "rejected" the two animal studies because (1) there were only two studies, (2) which used massive doses of PCBs, (3) which represented a preliminary stage of research, and (4) which tested animals, not humans. None of these reasons is sufficient to render an expert's opinion legally unreliable. The question is whether the expert's

use of these studies to help formulate an opinion is methodologically sound. The number of studies is irrelevant to this inquiry. As the Supreme Court made clear in *Daubert*, the fact that there are a limited number of studies does not undermine the utility of those studies in assisting an expert to form an opinion. See *Daubert*, 509 U.S. at —, 113 S.Ct. at 2797. Furthermore, it is improper to find research unreliable solely because it uses animal subjects. See *Paoli*, 35 F.3d at 781 (finding that the district court abused its discretion in excluding animal studies indicating probable link between PCBs and cancer).

Opinions of any kind are derived from individual pieces of evidence, each of which by itself might not be conclusive, but when viewed in their entirety are the building blocks of a perfectly reasonable conclusion, one reliable enough to be submitted to a jury along with the tests and criticisms cross-examinations and contrary evidence would supply. As the Supreme Court said in *Daubert*, “[t]hese conventional devices, rather than wholesale exclusion under an uncompromising ‘general acceptance’ test, are the appropriate safeguards where the basis of scientific testimony meets the standards of Rule 702.” *Daubert*, 509 U.S. at —, 113 S.Ct. at 2798.

In this case, the Joiners’ experts discussed the studies of at least thirteen different researchers, and referred to several reports of the World Health Organization that address the question of whether PCBs cause cancer. The Joiners’ experts testified that many of these studies were conducted and analyzed to test specific hypotheses about the relationship between PCBs and cancer, that many have been published in reputable scientific journals, and that they were generated and tested using the scientific method. In ruling the Joiners’ expert testimony inadmissible, however, it appears that the district court first viewed each expert’s opinions as based only on the six

studies discussed in her opinion⁹ and then accepted defendants’ criticisms of the conclusions reached in those studies, stating that “the studies simply do not support the experts’ position that PCBs *more probably than not* promoted Joiner’s lung cancer.” *Joiner*, 864 F.Supp. at 1326. As *Daubert* makes clear, the district court may not decide whether an expert’s opinions are correct, but merely whether the bases supporting the conclusions are reliable. *Daubert*, 509 U.S. at —, 113 S.Ct. at 2797 (“The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.”).

Instead of viewing the bases of an expert’s opinion as a whole to screen out mere speculation, the district court assessed only a portion of the studies relied upon by each of the Joiners’ experts, and then excluded the testimony because it drew different conclusions from the research than did each of the experts. Ultimately, the court should satisfy itself as to the legal reliability of proffered expert testimony, leaving the jury to decide the correctness of competing expert opinions.

2. Application of *Daubert* to this Case—Relevance

The second prong of *Daubert* requires the court to determine whether the “testimony ‘assist[s] the trier of fact to understand the evidence or to determine a fact in issue,’ ” by examining whether the “reasoning or methodology [underlying the testimony] can be applied to the facts in issue.” *Daubert*, 509 U.S. at —, 113 S.Ct. at 2795-96. The district court found that the experts’ opin-

⁹ With one exception, the district court did not have before it any of the studies it cited in its order granting defendants summary judgment. Instead, the court apparently relied on the very brief criticisms of these studies defendants provided in their summary judgment motion. *Joiner*, 864 F.Supp. at 1325 n. 27 (noting that “[w]ith one exception, neither party has provided the court with a copy of the studies cited in the briefs [and that] the court, for the most part has had to rely on the excerpts from

ions did not "fit" the facts in the case because "the opinions [linking PCBs to cancer] are inextricably bound up with the experts' assumption that Joiner was exposed to furans and dioxins," *Joiner*, 864 F.Supp. at 1320, an assumption the court deemed unfounded. Our review of the record indicates, however, that there appears to be a genuine factual dispute as to whether PCBs alone can cause cancer, and that this issue was inappropriate for summary judgment. Although the terms "PCBs," "dioxins," and "furans" often appeared together in each expert's proffered testimony, and at times the Joiners' experts asserted that it can be assumed furans and/or dioxins were present in the City's PCB-contaminated transformer fluid, it does not necessarily follow that each expert's opinion that PCB caused Joiner's cancer was contingent upon his exposure to furans or dioxins. During his deposition, Teitelbaum testified that

[t]here's sufficient information on PCBs. I brought the IPCS World Health Organization Criterion because it's just hot off the press, and the summary . . . indicates that as of 1987, IARC had concluded that the evidence for carcinogenicity in laboratory animals is sufficient. This is the latest piece of information, and there is no reason to doubt that, and they also concluded that PCBs are probably carcinogenic for humans.

Schechter similarly testified that "PCBs alone also cause cancer" in explaining that PCBs can initiate, as well as promote, cancer. Thus, in terms of the Joiners' claim that PCB alone can cause cancer, it becomes immaterial whether there were furans and dioxins in the fluid.

Similarly, with reference to the theory that Joiner was indeed exposed to furans and dioxins, it appears that a

the studies that the parties have provided in their briefs"). It further appears that the court did not consider Teitelbaum's testimony as to why the studies supported his opinion that PCBs cause cancer.

genuine dispute likewise exists over whether furans and dioxins could have been present in the dielectric fluid. For example, both of the Joiners' experts testified that furans can be generated when PCBs are exposed to fires and lightning, and that furans and dioxins are often found together with PCBs. Schechter stated that "[i]t is well documented that the heating of or burning of PCBs will create both the [furans] and deadly dioxins." Teitelbaum testified that furans would inevitably result given the fact that the City's transformers had suffered fires and lightning strikes on several occasions. Teitelbaum testified during his deposition that "one simply has to look at the chemistry of the situation and what's known about PCBs manufactured in this period and assume that there was some furan present, that there may have been some dioxin present, depending on the particular fire and circumstances." *Id.* at 1321.

Defendants sought to neutralize the impact of the Joiners' evidence by establishing that neither furans nor dioxins would have been produced unless the transformer fluid exceeded a certain temperature. Defendants' expert, Dr. John F. Brown, Jr., testified that the exposure of PCBs to temperatures of 300 degrees centigrade for several days could generate furans, but that it was unlikely the City would have allowed the temperature ever to reach 300 degrees during a bake-out because of potential damage to the transformer core. Brown did not comment, however, on the temperatures that may have been reached during an accidental transformer fire which, because it is not planned by the City, does not involve intentional damage to the transformer core. Nor did the defendants provide evidence of what the temperatures in these fires might have been, or establish that the temperatures, in fact, never exceeded 300 degrees. The defendants never succeeded in rebutting the conclusions of the Joiners' experts by either establishing a threshold temperature for the conversion of furans or dioxins in a PCB solution, or presenting any direct evidence of the actual temperatures

attained during either the bake-out process or accidental fires. In contrast, Teitelbaum, when asked if he was able to "determine the temperature created from the stadium lights that were used to bake the transformer coils," replied, ["Joiner] says it was hot enough for it to smoke, and oil smokes at around 700 degrees, 800 degrees [centigrade]." In addition, while defendants' expert, Dr. Thomas O. Rouse, testified that it would be "quite unlikely" for a lightening [*sic*] strike to cause the production of furans from PCBs, *id.* at 1317 n. 12, Teitelbaum testified in his affidavit that "Mr. Joiner was directly involved in the salvage of PCB containing transformers which had been involved in a lightning strike, [and that] a lightning strike and overheating of a transformer in the presence of oxygen in the dielectric fluid, inevitably produces [furans]."

For all of the foregoing reasons, the testimony of plaintiffs' experts was erroneously excluded and summary judgment should not have been granted. Accordingly, we reversed the summary judgment and remand for proceedings consistent herewith. REVERSED and REMANDED.

BIRCH, Circuit Judge, specially concurring:

I concur in this opinion because it properly emphasizes the role of the district court as "gatekeeper." The role of the trial judge, properly following the *Daubert* mandate, is to ensure that the conclusions reached by the scientific experts have some minimal level of reliability and probative value. This determination is accomplished by establishing that the predicate principles and methodology relied upon by the experts are valid and that they can be applied to the facts at issue. The *sufficiency* of the evidence and the *weight* of the evidence, however, are beyond the scope of the *Daubert* analysis. Whether the conclusions advanced from the stated premises in fact follow and the persuasiveness of these conclusions in the

ultimate resolution of competing opinions, are questions appropriately left to the finder of fact. The trial court, nevertheless, retains its responsibility of properly instructing the jury on burden of proof and ultimately entering judgment in appropriate circumstances—all *after* the evidence has been tested through cross-examination and rebuttal evidence has been introduced.

In discharging the *Daubert* mandate, the trial court can enhance the record for appellate review by appointing an expert, under Fed.R.Evid. 706, to assist the court in evaluating proffered scientific evidence. Augmentation of the record with the testimony of a competent, independent and philosophically neutral Rule 706 expert focused upon evaluating the reliability of the proffered expert evidence will likely promote a more comprehensive and adequate ruling by the trial court. As complex scientific and technical evidence becomes more commonplace, in this ever-advancing computer age, the need for the trial court generalist to seek expertise in discharging *Daubert* responsibilities becomes increasing [*sic*] evident and compelling.

SMITH, Senior Circuit Judge, dissenting:

I respectfully dissent because the majority improperly applies *Daubert v. Merrell Dow Pharmaceuticals*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993), and does not adequately clarify the roles of the expert, the trial court and the appellate court. The following analysis is based on a few basic ideas. As a "gatekeeper," the trial court must sift through expert testimony to decide not only whether an expert may testify, but what portion of the expert's testimony is admissible. A single expert may offer several opinions to reach his ultimate conclusion, and each opinion must be admissible under *Daubert*. Further, an expert's testimony does not "assist" the

trier of fact if the expert does not explain the steps he took to reach his conclusion. We should not require the trier of fact to accept blindly the expert's word to fill the analytical gap between proffered "scientific knowledge" and the expert's conclusions. Therefore, the trial court "gatekeeper" has broad discretion to decide whether a leap of faith across the analytical gap is so great that, without further credible grounds, the testimony is inadmissible.

I. Standard of Review

The majority states that, although we review the trial court's admissibility rulings for abuse of discretion, "we apply a particularly stringent standard of review to the trial judge's exclusion of expert testimony" and "our review is plenary" over the trial court's interpretation of evidence rules. Because understanding the scope of appellate review helps define the role of the trial court, I believe we should follow other circuits and present a more precise explanation of the standard of review. See, e.g., *Cook v. American Steamship Co.*, 53 F.3d 733, 738 (6th Cir.1995) (Three standards in reviewing admissibility of expert opinion: (1) trial court's factfinding is reviewed for clear error; (2) trial court's ruling whether opinion is scientific knowledge is question of law requiring plenary review; and (3) trial court's ruling whether opinion assists the trier of fact is reviewed for abuse of discretion); *Bradley v. Brown*, 42 F.3d 434, 436-37 (7th Cir.1995) (Plenary review of whether trial court applied Daubert framework, but trial court's findings not disturbed unless manifestly erroneous.).

In applying a "particularly stringent" review, we do not change the threshold of review, but conduct a searching review of the record (i.e., take a "hard look") while maintaining the proper standard of review. See, *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 749-50 (3d Cir.1994) (give a "hard look" (more stringent re-

view)" to decide whether the trial court abused its discretion), *cert. denied*, — U.S. —, 115 S.Ct. 1253, 131 L.Ed.2d 134 (1995). This court already suggested such a "hard look" where it remanded a case in light of *Daubert* and instructed the trial court to make specific factfindings to facilitate appellate review. *United States v. Lee*, 25 F.3d 997, 998 (11th Cir.1994). Under this "hard look," I offer for clear guidance review terminology that is firmly established in the jurisprudence of this and other circuits. Whether the trial court properly applied Rule 702 by following the framework set forth in *Daubert* is a question of law over which this court exercises complete and independent review. See, *Peterson v. Atlanta Housing Authority*, 998 F.2d 904, 912 (11th Cir.1993) ("The district court's conclusion of law is subject to complete and independent review by this court.") (quoting, *In re Sure-Snap Corp.*, 983 F.2d 1015, 1017 (11th Cir. 1993)); *Bradley*, 42 F.3d at 436-37. I suggest the term "complete and independent" as being more precise and accurate than the ubiquitous "de novo" where the review is in fact the first one ever conducted. "De novo" carries a connotation of repetition, as in a "trial de novo" after a matter has previously been tried. To suggest that an appellate court is conducting a "new" review of the trial court's conclusions of law is less than accurate when in fact those conclusions have never before been reviewed. The trial court's preliminary fact-finding during a Rule 104(a) hearing to determine the admissibility of expert opinion is reviewed for clear error. See, *Elston v. Talladega County Bd. of Ed.*, 997 F.2d 1394, 1405 (11th Cir.1993) ("We review the district court's findings of fact for clear error. A finding is clearly erroneous, when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.") (quoting *Anderson v. Bessemer City*, 470 U.S. 564, 573, 105 S.Ct. 1504, 1511, 84 L.Ed.2d 518 (1985)) (internal quota-

tions omitted); *Cook*, 53 F.3d at 738. In applying the *Daubert* framework, the trial court's ruling on whether the expert opinion is (1) reliable (i.e., scientific knowledge grounded in the methods and procedures of science) and (2) relevant (i.e., "fits" the facts of the case) is reviewed for abuse of discretion.¹ See, *Hibiscus Associates*

¹ Those circuits addressing *Daubert* have shown similar deference to the trial court's admissibility determinations. See, e.g., *Pedraza v. Jones*, 71 F.3d 194, 197 (5th Cir.1995) (trial court's ruling drug addict's expert testimony inadmissible is reviewed for abuse of discretion); *Gier v. Educational Service Unit No. 16*, 66 F.3d 940, 942 (8th Cir.1995) (trial court's ruling psychologist testimony inadmissible reviewed for "clear abuse of discretion"); *Deimer v. Cincinnati Sub-Zero Products, Inc.*, 58 F.3d 841, 844 (7th Cir.1995) ("[W]e apply a deferential standard of review . . . A decision to allow expert testimony is within the broad discretion of the trial judge and is to be sustained . . . unless manifestly erroneous.") (internal quotations omitted); *Cook v. American Steamship Co.*, 53 F.3d 733, 738 (6th Cir.1995) ("[W]hether the proffered expert opinion 'will assist the trier of fact to understand the evidence or to determine a fact in issue,' is a relevancy determination and therefore one we review for abuse of discretion."); *United States v. Dorsey*, 45 F.3d 809, 814 (4th Cir.1995) ("[E]ven under the *Daubert* analysis, a trial judge has a great deal of discretion in deciding whether to admit or exclude testimony.") (citing *United States v. Bynum*, 3 F.3d 769, 773 (4th Cir.1993) ("The [*Daubert*] Court emphasized that it was prescribing a 'flexible' rule, one committed, as are most questions of admissibility of evidence, to the discretion of the district courts."), cert. denied, — U.S. —, 114 S.Ct. 1105, 127 L.Ed.2d 416 (1994)), cert. denied, — U.S. —, 115 S.Ct. 2631, 132 L.Ed.2d 871 (1995); *American & Foreign Insurance Co. v. General Electric Co.*, 45 F.3d 135, 137 (6th Cir.1995) ("A trial court has broad discretion in the matter of the admission or exclusion of expert evidence, and . . . is to be sustained unless manifestly erroneous.") (internal quotations omitted); *Bradley v. Brown*, 42 F.3d 434, 436-37 (7th Cir.1995) ("We first undertake a de novo review of whether the district court followed the framework set forth in *Daubert*[, and if so,] we will not disturb the district court's findings unless they are manifestly erroneous."); *In re Paoli*, 35 F.3d 717, 749-50 (3d Cir.1994) (a "hard look" at trial court's exercising its dis-

Ltd. v. Board of Trustees, 50 F.3d 908, 917 (11th Cir. 1995) ("A judge has broad discretion to exclude expert testimony, and his action will be upheld unless it is manifestly erroneous.").

II. Admissibility of Expert Testimony

After presenting a thorough review of the *Daubert* standard, the majority errs by first applying the reliability prong of *Daubert* to the experts' opinions as a whole, and then applying the relevancy prong. This approach treats all the experts as offering only one opinion leading to the ultimate conclusion that transformer dielectric fluids promoted Mr. Joiner's small cell lung cancer. However, each expert is actually offering several opinions leading to that ultimate conclusion. For example, the experts offer opinions that (1) furans and dioxins were present and (2) furans and dioxins promoted Mr. Joiner's cancer. Each of these assertions is a separate opinion which must meet the *Daubert* standard, regardless of whether the assertions are given by the same or different experts. As the *Paoli* court stated,

[T]he requirement of reliability, or "good grounds," extends to each step in an expert's analysis all the way through the step that connects the work of the expert to the particular case . . . [A]ny step that renders the analysis unreliable under the *Daubert* factors renders the expert's testimony inadmissible.

Paoli, 35 F.3d at 743, 745 (emphasis omitted).

cretion); *United States v. Rincon*, 28 F.3d 921, 923 (9th Cir. 1994) (admissibility of expert opinion on eyewitness identification reviewed for abuse of discretion), cert. denied, — U.S. —, 115 S.Ct. 605, 130 L.Ed.2d 516 (1994); and *United States v. Muldrow*, 19 F.3d 1332, 1337 (10th Cir.1994) ("We review a trial court's admission of evidence under an abuse of discretion standard."), cert. denied, — U.S. —, 115 S.Ct. 175, 130 L.Ed.2d 110 (1994).

The majority admonishes the trial court for not "viewing the bases of an expert's opinion as a whole." However, sifting through the expert's testimony is a crucial "gatekeeping" function that not only requires the trial court to decide which experts may testify, but also requires the trial court to decide what the experts may testify about (i.e., the trial court must separate the wheat from the chaff). Litigants may not offer all of an expert's testimony so long as they can search and find some portion that is admissible. Similarly, an expert may not bombard the court with innumerable studies and then, with blue smoke and sleight of hand, leap to the conclusion. Instead, the expert must explain how the opinion drawn from each study is acceptable under *Daubert* (i.e., how the study is methodologically grounded and "fits" the facts of the case), else the expert cannot testify about that particular study.

A. Exposure to PCBs, Furans and Dioxins

Although finding there is a genuine dispute whether Mr. Joiner was exposed to PCBs, the trial court found insufficient evidence that Mr. Joiner was exposed to furans or dioxins. The trial court dismissed Mr. Joiner's assertion that furans were created from PCBs in fire conditions because, although there was evidence of fire and other "hot" conditions, Mr. Joiner failed to show that conditions reached the requisite temperatures in this case (i.e., "fit"). *Joiner v. General Electric Co.*, 864 F.Supp. 1310, 1317-18 (N.D.Ga.1994).

The majority concludes the trial court committed reversible error by overlooking a minor passage from Dr. Teitelbaum's affidavit that provides specific evidence of "fit": (1) the transformer's were smoking which requires temperatures of 700 to 800 degrees centigrade and (2) some transformers were struck by lightning which inevitably produces furans. The majority further suggests

the trial court's ruling was erroneous because the defendants presented no evidence that the fires did not reach the requisite temperature. However, I disagree and I am not prepared to reverse the trial court on this issue because it is Mr. Joiner who has the burden of proving admissibility. *Daubert* at —, 113 S.Ct. at 2796 n. 10 (citing *Bourjaily v. United States*, 483 U.S. 171, 175-76, 107 S.Ct. 2775, 2778-79, 97 L.Ed.2d 144 (1987)); see also, *Deimer*, 58 F.3d at 345 (The expert "had the responsibility to apply his analysis to the facts of this case."); *American & Foreign Insurance Co.*, 45 F.3d at 139 ("[T]he burden is on the [party seeking to admit expert testimony] to persuade this court that the testing was reliable and supported by raw data."). In making its ruling, the trial court sifted through such overwhelming evidence that it inevitably overlooked the passage from Dr. Teitelbaum's affidavit. More importantly, Mr. Joiner himself failed to disclose this passage notwithstanding his burden of proving admissibility or his knowing the case hinged on such evidence. Mr. Joiner failed to cite this or any similar passage on appeal. Indeed, this passage would have been forever lost had it not been for the diligent, searching eye of the majority. I am not prepared to place such a burden on either the trial or appellate courts. Similarly, I am not prepared to encourage litigants to inundate the courts with raw data and force the courts to process the data to determine why certain evidence is admissible. The litigants and their experts should know their evidence better than anyone—they should be their own advocates for its admission.

I would also affirm the trial court on the issue of exposure to dioxins. The trial court properly discarded treatise excerpts as inadmissible hearsay because they were not offered through expert testimony. The trial court did not abuse its discretion in discarding testimony that dioxins can be formed from Pyranol because there was no evidence that Pyranol was or may have been present in this

case (i.e., "fit"). Nor did the trial court abuse its discretion in excluding testimony that burning PCBs produces dioxins where the testimony did not reference any supporting studies (i.e., grounded in science). Finally, the trial court did not abuse its discretion in finding that expert testimony concerning a specific incident "has little probative value given the evidentiary deficits in this case." *Joiner* at 1319.

B. Causation—Promotion of Cancer

The trial court gave two alternative grounds for granting summary judgment on the issue of causation(i.e., whether Mr. Joiner's exposure to dielectric fluid promoted his cancer): (1) the experts' testimony did not "fit" because they assumed Mr. Joiner was exposed to furans and dioxins and (2) the experts did not show how the studies they relied on "fit" this case. Regarding the former ground, I am not prepared to reverse the trial court due to Mr. Joiner's failing to disclose the critical passage regarding the temperature of the transformers which would have provided the "fit" required to admit evidence about furans and dioxin exposure. Moreover, I would affirm the trial court on the latter ground because it did not abuse its discretion in finding the experts failed to show how the proffered studies "fit" this case.

1. *Mice Studies*.—The trial court found the experts' reliance on mice studies was questionable because (1) there were only two studies; (2) the studies used massive doses; and (3) the studies yielded only preliminary results. *Joiner* at 1323. The trial court excluded the studies because Mr. Joiner did not respond to these concerns, but merely "proceed[ed] as if the only issue is whether animal studies can ever be [proper]." *Joiner* at 1324 (emphasis added). The majority opinion apparently adopts Mr. Joiner's argument, stating that "it is improper to find research unreliable solely because it uses animal

subjects." However, this ignores the trial court's concern that the experts have not demonstrated how these mice studies "fit" this particular case.

In discussing "fit," the Supreme Court stated,

The study of the phases of the moon . . . may provide valid scientific "knowledge" about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (*absent creditable grounds supporting such a link*), evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night.

Daubert at —, 113 S.Ct. at 2796 (emphasis added). In explaining the concept of "fit," the *Paoli* court stated,

[Expert] testimony will be excluded if it is not scientific knowledge for the purposes of this case. . . . [I]n order for animal studies to be admissible to prove causation in humans, there must be good grounds to extrapolate from animals to humans, just as the methodology of the studies must constitute good grounds to reach conclusions about the animals themselves.

Paoli, 35 F.3d at 743 (emphasis in original).

The trial court's ruling was not that animal studies are inadmissible *per se*, but that Mr. Joiner's general response that experts generally rely on animal studies fails to show the reliability and "fit" of these particular animal studies. *Joiner* at 1324 n. 25. The trial court's concern is that the proffered studies (1) were on mice, not humans; (2) were of substantially higher doses of PCBs than Mr. Joiner's exposure; (3) resulted in a different form of cancer than Mr. Joiner's; (4) yielded only preliminary results and (5) were not accompanied by other studies (there were only

two studies). Because Mr. Joiner failed to address the latter two concerns, the trial court found the studies were unreliable. Regarding the other concerns about "fit", the trial court found that Mr. Joiner did not present "credible grounds for supporting" the link between these mice studies and Mr. Joiner's cancer.²

It is incumbent on the proponent of scientific evidence to fill the analytical gap between a proffered study and the particular facts of the case (i.e., "fit"). *Daubert* at — n. 10, 113 S.Ct. at 2796 n. 10 (citing *Bourjaily v. United States*, 483 U.S. 171, 175-76, 107 S.Ct. 2775, 2778-79, 97 L.Ed.2d 144 (1987)); see also, *Deimer*, 58 F.3d at 345 (The expert "had the responsibility to apply his analysis to the facts of this case."); *American & Foreign Insurance Co.*, 45 F.3d at 139 ("[T]he burden is on the [party seeking to admit expert testimony] to persuade this court that the testing was reliable and supported by raw data."). The trial court exercises its discretion to determine whether such a showing has been made, weighing several factors including the "liberal thrust" toward admitting expert evidence, the adversarial system's ability to scrutinize admitted evidence, and the powerful influence of expert opinion.³ *Daubert* at —,

² Had this law suit involved mice exposed to high doses of PCB's who developed some type of lung cancer, the "fit" would have been self-evident. However, the relationship between the studies and the facts of this case is much more tenuous.

³ In this regard, the *Daubert* Court stated,

Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence. . . . Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice

—, 113 S.Ct. at 2794, 2798. Where no other scientific evidence is offered to fill the analytical gap, the trier of fact is required to take the expert simply on his word, placing blind faith in his expertise. However, if the trial court finds the expert testimony requires too great a leap of faith across the analytical gap, it may properly request good grounds to bridge the gap before admitting the testimony. See, *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349, 1360-61 (6th Cir.1992) (Regarding animal studies used to show the cause of birth defects, the court found "[t]he analytical gap between the evidence presented and the inferences to be drawn on the ultimate issue . . . is too wide. Under such circumstances, a jury should not be asked to speculate on the issue of causation."), cert. denied, 506 U.S. 826, 113 S.Ct. 84, 121 L.Ed.2d 47 (1992). This is not too onerous a request because the expert should certainly have reasons for drawing his conclusions from the study, else his testimony is inadmissible as the "subjective belief or unsupported speculation" that *Daubert* requires the trial court "gatekeeper" to screen out.⁴ *Daubert* at —, 113 S.Ct. at 2795.

against probative force under Rule 403 . . . exercise more control over experts than over lay witnesses.

Daubert at —, 113 S.Ct. at 2798.

⁴ Common law precluded an expert from testifying at all about an ultimate fact in issue, relegating his role to guiding the trier of fact up to the ultimate fact without taking the final step. Although an expert may now testify to an ultimate fact, this permissiveness certainly does not permit an expert to testify solely to an ultimate fact without guiding the trier of fact to that conclusion. For example, an expert could not give a one sentence testimony. "Mr. Joiner's lung cancer was promoted by his exposure to dielectric fluid, you can take my word for it." Nor would he save his testimony by adding, "I've heard of studies that show saccharine causes cancer in laboratory animals." In order to "assist" the trier of fact, the expert must further explain his reasoning by testifying about what studies he relies on to form

Therefore, the trial court did not abuse its discretion in ruling the mice studies testimony inadmissible where Mr. Joiner completely failed to respond to the trial court's concerns.

2. *Epidemiological Studies*.—The trial court disregarded the experts' reliance on epidemiological studies because "in every case . . . the studies are either equivocal or not helpful" and "simply do not support the experts' position, that PCBs *more probably than not* promoted Joiner's lung cancer." *Joiner* at 1324, 1326 (emphasis in original). The majority reverses the trial court on this issue, alleging the trial court improperly decided whether the experts' conclusions were correct instead of limiting its analysis to whether the studies were reliable. I respectfully disagree; the trial court's concern is with "fit," not whether the experts are correct.

The *Paoli* court recognized that the distinction between focusing on an expert's methodology instead of his conclusion "has only limited practical import." *Paoli* at 746. The court explained,

When a judge disagrees with the conclusions of an expert, it will generally be because he or she thinks there is a mistake at some step in the investigative or reasoning process of that expert. . . . [A] challenge to "fit" is very close to a challenge to the expert's ultimate conclusion about the particular case, and yet it is part of the judge's admissibility calculus under *Daubert*.

Paoli at 746. By directing attention away from the trial court's choice of terminology and toward its actual analysis, I conclude that the trial court did not abuse its discretion in ruling each study inadmissible.

his opinion, how reliable are the studies, and how the studies relate to this particular case.

The trial court found the Bertazzi capacitor manufacturers study inadmissible because its results showed "no grounds" for linking exposure to lung cancer, and the specific excerpts relied on by the experts merely show the "plausibility," not probability, that exposure could cause cancer. *Joiner* at 1324 n. 26. These concerns alone are not dispositive because an expert may analyze a study and draw different conclusions than the study. However, an expert should have reasons for differing with the study or for finding that the study supports his conclusion notwithstanding language in the study to the contrary. Because Mr. Joiner failed to respond and provide supporting grounds, the trial court did not abuse its discretion in ruling this evidence inadmissible.

The trial court ruled the Zack & Musch Monsanto study inadmissible where the study itself stated that the results were not "statistically significant." *Joiner* at 1325. The trial court ruled the Norwegian cable manufacturers study inadmissible because it "never mentions PCBs," involves mineral oil exposure, and the study itself concludes that "[f]urther follow up . . . studies . . . are needed before any firm conclusions may be drawn." *Joiner* at 1325. The trial court also ruled the Yusho accidental toxic exposure study inadmissible because the study was a "preliminary report," the study involves persons exposed to furans and dioxins, and Mr. Joiner's own expert testified that the study "is not very convincing as the Japanese lifestyle is different . . . [it is] suggestive but not convincing." *Joiner* at 1326 (quoting Deposition of Dr. Teitelbaum). As with the Bertazzi study, the trial court did not abuse its discretion where Mr. Joiner failed to respond to the trial court's concerns and provide further grounds for relying on these studies.

III. Conclusion

The trial court properly applied *Daubert* and did not abuse its discretion in ruling certain expert testimony in-

admissible. Based on these rulings, there is insufficient evidence on the issue of causation. Therefore, I would affirm the trial court's granting summary judgment in favor of defendants. Moreover, I caution against using the majority's approach that applies each *Daubert* prong to the testimony as a whole. I would approve the trial court's step-by-step approach which properly anticipates a single expert as offering more than one opinion to support his ultimate conclusion.

APPENDIX B

[Filed June 11, 1996]

IN THE UNITED STATES COURT OF APPEALS
FOR THE ELEVENTH CIRCUIT

No. 94-9131

ROBERT K. JOINER, KAREN P. JOINER,

Plaintiffs-Appellants,

versus

GENERAL ELECTRIC COMPANY, A New York Corporation;
WESTINGHOUSE ELECTRIC CORPORATION, A Pennsylvania Corporation;
MONSANTO COMPANY, A Delaware Corporation,

Defendants-Appellees.

On Appeal from the United States District Court
for the Northern District of Georgia

BEFORE: BIRCH and BARKETT, Circuit Judges, and
SMITH * Senior Circuit Judge.

PER CURIAM:

The petition(s) for rehearing filed by Appellees, General Electric Co., etal, is denied.

ENTERED FOR THE COURT:

/s/ ROSEMARY BARKETT
United States Circuit Judge

* Honorable Edward S. Smith, Senior U.S. Circuit Judge for the Federal Circuit, sitting by designation.

[Filed June 11, 1996]

IN THE UNITED STATES COURT OF APPEALS
FOR THE ELEVENTH CIRCUIT

No. 94-9131

ROBERT K. JOINER, KAREN P. JOINER,
Plaintiffs-Appellants,

versus

GENERAL ELECTRIC COMPANY, A New York Corpora-
tion; WESTINGHOUSE ELECTRIC CORPORATION, A Penn-
sylvania Corporation; MONSANTO COMPANY, A Dela-
ware Corporation,

Defendants-Appellees.

On Appeal from the United States District Court
for the Northern District of Georgia

ON PETITION(S) FOR REHEARING AND
SUGGESTION(S) OF REHEARING EN BANC

BEFORE: BIRCH and BARKETT, Circuit Judges, and
SMITH *, Senior Circuit Judge.

* Honorable Edward S. Smith, Senior U.S. Circuit Judge for the
Federal Circuit, sitting by designation.

PER CURIAM:

The Petition(s) for Rehearing are DENIED and no mem-
ber of this panel nor other Judge in regular active service
on the Court having requested that the Court be polled
on rehearing en banc (Rule 35, Federal Rules of Appel-
late Procedure; Eleventh Circuit Rule 35-5), the Sugges-
tion(s) of Rehearing En Banc are DENIED.

ENTERED FOR THE COURT:

/s/ ROSEMARY BARKETT
UNITED STATES CIRCUIT JUDGE

APPENDIX C

[Filed Sep. 16, 1994]

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION

CIVIL NO. 1:92-cv-2137-ODE

ROBERT K. JOINER and KAREN P. JOINER

vs.

GENERAL ELECTRIC COMPANY,
WESTINGHOUSE ELECTRIC CORPORATION,
and MONSANTO COMPANY

ORDER

This diversity action is before the court on Defendants' joint motion for summary judgment, Defendants' request for oral argument on their motion for summary judgment, Plaintiffs' request for oral argument on Defendants' motion for summary judgment, and General Electric Company's motion requesting supplemental brief. Plaintiffs have filed a response in opposition to Defendants' motion for summary judgment; Plaintiffs' time to respond to the motion requesting supplemental brief has not yet expired.

Unless otherwise noted, the evidence of record shows that the following facts are not in dispute: Robert K. Joiner ("Joiner") was born on February 9, 1954. Joiner smoked cigarettes for approximately eight years. He quit in 1980 or 1981. For the last two to three years before

he quit, Joiner smoked one pack of cigarettes a day. Both of Joiner's parents smoked around Joiner while he was growing up. Joiner's father, who died when Joiner was 12, smoked throughout the time Joiner knew him. Plaintiff's mother, who died of lung cancer when Joiner was 23, smoked up to the time of her death. Joiner's maternal uncle also died of lung cancer.

Since 1973, Joiner has worked for the City of Thomasville, Georgia ("City") in the City's Water & Light Department. For the last seven to eight years, Joiner has held the title of Chief Electrician. As an incident of his job Joiner has frequently worked with and around the City's electrical transformers and voltage regulators. Joiner testified that work on electrical transformers consumed 40 to 50% of his time, while work on voltage regulators took 1% of his time.¹

As a rule, a transformer is filled with a "dielectric fluid" that both cools and insulates the mechanism inside the transformer. This fluid typically has been a petroleum-based, flammable mineral oil. However, transformers filled with flammable mineral oil present a fire hazard when used in certain locations. Relatively early in this century a fire-resistant dielectric fluid was developed that did not contain mineral oil. Polychlorinated biphenyls ("PCBs"), a man-made chemical, were one component of the fire-resistant fluid. However, the PCB-based dielectric fluid was never widely used; "[t]he EPA has estimated that less than two-tenths of a percent (0.2%) of all utility transformers were PCB transformers. See 47 Fed.Reg. 17426, 17428 (1982), 'Polychlorinated Biphenyls (PCBs): Use in Electrical Equipment.'" (Defendants' Joint Memorandum in Supp. of Summ.Judg. ["Defendants' Brief"] at 6.)

¹ For ease of reference, the court hereafter uses the terms "transformer" or "transformers" for both electrical transformers and voltage regulators.

With limited exceptions, Congress banned the production and sale of PCBs on January 1, 1978. 15 U.S.C. § 2605(e)(2)(A). Congress took this action because in its view PCBs "present an unreasonable risk of injury to health or the environment." See 15 U.S.C. § 2605(a).

Monsanto manufactured PCBs from 1935 to 1977.² General Electric Company ("GE") and Westinghouse Electric Corporation ("Westinghouse") manufacture both transformers and fire-resistant fluid. From the 1930s to the 1970s, both GE and Westinghouse marketed fire-resistant fluid containing PCBs; GE's product carried the trade name "Pyranol," while Westinghouse's carried the trade name "Inerteen."

Throughout the time of Plaintiff's employment, all of the City's transformers have used mineral oil-based dielectric fluid, which should be free of PCBs. However, beginning in 1983, the City discovered, via systematic testing, that the dielectric fluid in some of its transformers was contaminated with PCBs.³ From 1983 to 1993, the City tested approximately 2,668 of its transformers.⁴ Approximately half of the transformers tested showed PCB contamination. However, the EPA considers any

² Plaintiffs assert, without contradiction from Defendants, that after 1935 Monsanto was the sole manufacturer of PCBs in the United States.

³ Defendants assert that

[a]lthough there are several methods by which this contamination could have occurred, including through maintenance and repair, the source of the PCB contamination is not an issue in this motion for summary judgment, which is limited to the causal connection, if any, between PCBs and Mr. Joiner's small cell lung cancer.

(Defendants' Brief at 6 n. 7.)

⁴ The court reached this figure using the computer printout that is attached to the affidavit of Mark Homyk, the City's Director of Engineering and Electrical Operations. Neither side has cited to the court evidence regarding the total number of transformers the City possesses.

transformer that contains PCBs at a level less than 50 ppm to be a "non-PCB transformer" which is not subject to regulation. 40 C.F.R. § 761.3 (1993). Of all the transformers tested, about 2.5% contained levels of PCBs above 500 parts per million ("ppm"), while about 16.7% contained levels above 50 ppm.⁵ Thus, almost one out of every five (i.e., 19.2%) of the transformers the City tested presented a PCB hazard.

When a transformer was in need of repair, it was . . . Joiner's duty to open it up, drain out the dielectric fluid, bake the core of the transformer dry of dielectric fluid, make repairs which were within his skills, refill the transformer with fresh mineral oil dielectric fluid, and then test the transformer for proper operation. The process of repairing transformers required that . . . Joiner stick his hands and arms into the dielectric fluid to perform necessary repairs and disassembles. The next step required the separation of the core of the transformer from the tank so that it could be dried, cleaned, inspected and repaired. This step also exposed . . . Joiner to the dielectric fluid. . . .

In order to dry the transformer, a process called "baking out" was followed. During the baking out process, the dielectric fluid which covered the core after it was untanked was baked off the transformers, for several days at a time, with the intense heat of football field lights, to the point of smoking, until the core was dry. Baking out is a recommended maintenance practice.

(Plaintiffs' Brief in Opp. to Defendants' Motion for Summ. Judg. ["Plaintiffs' Brief"] at 20-21.)⁶

⁵ One of the transformers tested (which neither GE nor Westinghouse had manufactured) contained PCBs at the level of 1,880 ppm. This was the highest reported level for any of the City's tested transformers.

⁶ During his deposition, Joiner testified that dielectric fluid got all over him at times. (Joiner Dep. at 95.) He also testified that

In 1991, at the age of 37, Joiner was diagnosed with lung cancer. Defendants assert that Joiner's ailment is of a variety known as "small cell lung cancer." In response, Plaintiffs argue that "a description of the particular cancer as being 'small cell' cannot be admitted as lung cancer cannot readily be catalogued this simply." (Plaintiffs' Response to Defendants' Statement of Material Facts, etc., ¶ 8.) Plaintiffs offer no evidence to support their objection. Moreover, through the affidavit of Joanne Beauvoir Brown, counsel for Monsanto Company ("Monsanto"), Defendants have submitted a pathology report that contains the following diagnosis:

We performed routine H & E staining on one slide and immunohistochemical staining for cytokeratin, T-cell antigen (UCHL) and B-cell antigen (L26) on the others. The routine H & E stained slide shows a poorly differentiated malignant tumor present within soft tissue. There is extensive crush artifact that makes interpretation difficult. However, the tumor is composed of small cells with dispersed nuclear chromatin pattern and scant cytoplasm. The cells infiltrate between adipose tissue and lack cohesion. The differential diagnosis on the routine stain is between a small cell carcinoma and a lymphoblastic lymphoma. Our immunohistochemical stains show weak staining in the cells for cytokeratin and negative staining for the lymphoid markers. These findings confirm the epithelial nature of the tumor and support a diagnosis of small cell carcinoma.

(Brown Aff., Ex. A.) Given this evidence, the court finds that there is no genuine dispute over the fact that Joiner suffers from small cell lung cancer.

Dr. Arthur L. Frank (M.D.) is one of Plaintiffs' experts. His affidavit provides in part as follows:

he had swallowed a small amount of dielectric fluid when it splashed into his mouth, *id.* at 102, and that dielectric fluid had splashed into his eyes on several occasions, *id.* at 103.

Lung cancer, like other cancers, begins with an initiated cell. The initiator can be any number of things including, but not limited to, tobacco smoke. An initiated cell does no harm by itself until it is promoted. An initiated cell can survive for a number of years without any harmful effects on the body. There are a wide variety of known and suspected promoters of lung cancer.

Epidemiology studies and statistics, and my own personal observations and experience, indicate that lung cancer is extremely rare for a thirty seven year old white male in the United States. This is true even for persons with a history of tobacco use. Lung cancer, as a general rule, is not seen until much later in life.

....

... It is more likely than not, given Mr. Joiner's limited tobacco use, and also considering his second hand tobacco smoke exposure, and given his age at the onset of lung cancer, 37 years, that tobacco smoke served only as the initiator of the cancer and that some other agent served as the promoter of the initiated cells. It was the promotion of the initiated cells which caused Mr. Joiner to be harmed.

(Frank Aff., ¶¶ 5, 6, 8.) Plaintiffs' theory, as stated by their experts, is that PCBs and their derivatives—polychlorinated dibenzofurans ("PCDFs" or "furans") and polychlorinated dibenzodioxins ("PCDDs" or "dioxins")—served as promoters of Joiner's lung cancer.

On August 5, 1992, Plaintiffs filed this action in the State Court of Fulton County, Georgia. Defendants timely removed the action to this court. The complaint contains the following counts:

Count One—Strict liability against GE and Westinghouse.

Count Two—Negligence against GE and Westinghouse.

Count Three—Fraud against GE and Westinghouse.

Count Four—Strict liability against Monsanto.

Count Five—Negligence against Monsanto.

Count Six—Loss of consortium against all Defendants.

Count Seven—Punitive damages against all Defendants.

On August 24, 1993, Plaintiffs, with leave of court, amended their complaint. This amendment made Count Seven a claim of battery against all Defendants, while the punitive damages claim became Count Eight.

Summary judgment is appropriate only "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." Fed.R.Civ.P. 56(c). In ruling on Defendants' motion, the court must view the evidence in a light most favorable to Plaintiffs. *Adickes v. S.H. Kress & Co.*, 398 U.S. 144, 157 (1970). To prevail on their motion for summary judgment, Defendants must show that the evidence is insufficient to establish an essential element of Plaintiffs' case. *Celotex Corp. v. Catrett*, 477 U.S. 317, 325 (1986). If Defendants make a sufficient showing, then Plaintiffs "must come forward with 'specific facts showing that there is a genuine issue for trial.'" *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986) (quoting Fed.R.Civ.P. 56(e)). If the evidence supporting Plaintiffs' claims is insufficient for a jury to return a verdict for Plaintiffs, or is merely colorable or not significantly probative, then Defendants are entitled to summary judgment. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 249 (1986). If, however, reasonable minds could differ

as to the import of the evidence, and a reasonable interpretation of the evidence could lead to a verdict for Plaintiffs, then summary judgment is inappropriate. *Id.* at 251-52.

Defendants offer two grounds in support of their motion for summary judgment: One ground is that Joiner did not suffer significant exposure to PCBs, furans, or dioxins. The other ground is that "plaintiffs . . . cannot present credible, admissible scientific evidence that . . . small cell lung cancer in humans can be caused or promoted by PCBs." (Defendants' Brief at 10.) In light of these arguments, the court first must determine if there is a genuine dispute over the allegedly-carcinogenic substances to which Plaintiffs assert Joiner was exposed. Second, the court must determine if Defendants are correct in arguing that Plaintiffs cannot show a link between PCBs and small cell lung cancer.

EXPOSURE

Defendants first argue that Joiner was not exposed to significant amounts of PCBs and, even if he was, that he did not receive a harmful dose. Defendants offer the following explanation of the difference between the terms "exposure" and "dose":

In toxicology, "dose" or "intake" indicates the amount of chemical that is actually absorbed into the body. "Exposure" means the eligibility or potential to have contact with a particular chemical. The fact that one may have been potentially exposed to a chemical such as PCBs does not prove that one has absorbed a dose of PCBs.

(Defendants' Brief at 4 n. 4.) Defendants make several arguments in support of the exposure/dose ground of their motion for summary judgment:

1. Joiner's exposure to transformers that presented a PCB hazard was episodic, not daily, from 1973 to sometime between 1983 and 1987.
2. All of the transformers the City purchased were filled with mineral oil-based dielectric fluid.
3. Only one out of five of the City's transformers presented a PCB hazard.
4. Plaintiffs' test of the PCB content of Joiner's adipose tissue revealed a PCB level of 0.3 ppm, while Plaintiffs' experts testified that the average PCB level in North America for persons without any occupational exposure to PCBs is 0.4 or 0.5 ppm.⁷

The evidence Defendants rely upon to argue that Joiner was not exposed to PCBs can as easily be viewed as follows: Joiner has worked for the City for many years; at least 512 of the City's transformers (i.e., 19.2% of 2668 transformers tested) presented a PCB hazard; and disassembly of transformers was a routine part of Joiner's work. Given this view of the facts, the court finds that Defendants' first three arguments do nothing more than show the need for a jury to weigh and then choose one of the conflicting interpretations that each side advances for the same evidence.

Further, Plaintiffs accurately note two problems with Defendants' fourth argument. First, Plaintiffs point out that while the results of a Joiner's adipose tissue test do not show a higher than normal ppm level, the results do, in fact, show that Joiner has been exposed to PCBs. Second, through the affidavit of Dr. Arnold Schecter (M.D.),

⁷ Neither party has cited to the court evidence regarding the definition of "adipose tissue." A commonly-used dictionary defines the term as "animal tissue in which fat is stored, consisting of connective tissue with the cells distended by droplets of fat and constituting the fat of meat." *Webster's Third New International Dictionary* 26 (Merriam-Webster 1986). The court takes judicial notice of this definition. See Fed.R.Evid. 201(b), (c).

one of their experts, Plaintiffs contend that the existence of Joiner's cancer, the treatment of the cancer, and passage of time together make unreliable the low level that the adipose tissue test shows:

No study has been documented that examines subjects who have experienced weight loss associated with cancer, chemotherapy associated with cancer, and radiation therapy associated with cancer, as well as been subjected to excessive PCB, dioxin or dibenzofuran exposure. As a result, there is no control group to which Robert Joiner can be compared. . . .

Adipose levels which are low do not mean that higher levels did not exist at earlier times. This is because PCBs are metabolized and excreted from the body over time.

(Schecter Aff., ¶ 22.) Defendants attack Dr. Schecter's affidavit as inconsistent with his deposition and also offer the testimony of their own expert in rebuttal to Dr. Schecter's position.⁸ In doing this, Defendants succeed

⁸ In this context, a "congener" is "a chemical substance related to another (as a derivative or an element in the same group of the periodic table as another element)." *Webster's Third New International Dictionary* 478 (Merriam-Webster 1986). The court judicially notices this definition. See footnote 7, *supra*. Dr. Schecter responded in the affirmative when asked whether the congeners of high-chlorinated PCBs remain at a relatively constant level for several years in human adipose tissue. (Schecter Dep. at 107.) At another point, Dr. Schecter testified that "I do have an opinion that the metabolism is going to be altered and there are—obviously will be transfer and changes. *How they will be reflected in these tests, I don't know.*" *Id.* at 30-31 (emphasis added). Dr. John F. Brown, Jr. (Ph. D.), one of Defendants' experts, testified that

the level of PCB's and PCDF's were both within the lower part of the range normally involved in environmentally exposed populations, that there were no obvious abnormalities that might have resulted from accelerated clearance, that the homologue distribution in the PCB's were again very similar to what we and many others have seen in background populations.

(Brown Dep. at 87.)

only in showing a dispute in the evidence, not the absence of evidence.

In view of the foregoing discussion, the court finds that a genuine dispute exists over whether Joiner was exposed to PCBs. Thus, Defendants are not entitled to summary judgment on this issue. It remains to be seen if there is a genuine dispute on the furans/dioxins issues.

Defendants make the following arguments to show the absence of evidence that furans and/or dioxins were in the PCBs to which Joiner allegedly was exposed:

(1) [T]here is no analytical test data that any of Thomasville's transformers or voltage regulators ever contained any PCDFs or PCDDs (Schechter Depo., at 86); (2) plaintiffs had Mr. Joiner's adipose tissue analyzed for the presence of PCDFs and PCDDs, and demonstrated that his body levels for both were virtually nondetectable and well below background levels (Robertson Depo., Exhibit 7);⁹ (3) there is no scientific evidence that PCDDs are created from PCBs under any conditions (Rouse Depo., at 86);¹⁰ (4) Dr. Schechter does not know whether the formation of PCDFs from PCBs would be inhibited or reduced by the dilution of PCBs in mineral oil (Schechter Depo., at 133-134); and (5) Dr. Schechter does not know the temperature or other conditions necessary to generate PCDFs from PCBs (Schechter Depo., at 133).

(Defendants' Brief at 24.) The court first addresses the furans issue.

Defendants' first argument is correct. Plaintiffs can point to no test data that shows the existence of furans or dioxins in any of the City's transformers.

⁹ Dr. Larry Robertson (Ph.D.) is one of Plaintiffs' experts.

¹⁰ Dr. Thomas O. Rouse (Ph.D.) is one of Defendants' experts.

Defendants' second argument is also correct. Plaintiffs do not dispute that the adipose tissue test showed negligible levels of furans and dioxins. Even though they arranged to have the test conducted, Plaintiffs now contend that the test results should be disregarded because the testing agency used an inappropriate methodology and there is no control group against which to compare the results. (Plaintiffs Brief at 25-26.) Dr. Schechter supports this contention. (Schechter Aff., ¶ 22.)¹¹

Defendants' fourth argument is substantially accurate. During his deposition, Dr. Schechter testified that he did not recall any studies which showed that mineral oil inhibits or reduces the formation of furans from PCBs. (Schechter Dep. at 133.) Both Doctors Brown and Rouse testified that the production of furans from PCBs would be inhibited if the PCBs were diluted in mineral oil. (Brown Dep. at 24-25, 31; Rouse Dep. at 40-41.)

Defendants' fifth argument is not totally accurate. Dr. Schechter testified that in temperatures between 200 and 600 degrees centigrade "you get a yield of PCBs being empirically converted to a reasonable[y] larger yield of

¹¹ Dr. Schechter's affidavit reads in part as follows:

I discussed the techniques followed by Triangle Laboratories with the chemist who conducted the tests. I believe mistakes were made. I do not believe that a reasonable scientist could use these results to compare Robert Joiner to other humans. The results show no detectable levels of PCDDs in Robert Joiner's blood for congeners which are known to exist at detectable levels in adults in North America. This casts considerable doubt on the methodology followed and further convinces me that no reasonable and experienced dioxin medical scientist would rely on them.

(Schechter Aff., ¶ 22.) In their reply, Defendants assert that "it is hardly appropriate scientific methodology to obtain adipose tissue measurements, then claim they are unreliable because they do not show what you hoped they would." (Defendants' Joint Mem. in Reply to Plaintiffs' Brief in Opp. to Defendants' Motion for Summ. Judg. ["Defendants' Reply"] at 3 n. 4.)

dibenzofurans." (Schechter Dep. at 115.) However, Dr. Schechter declined to state, even after repeated questioning, what the minimum temperature is for the formation of furans from PCBs. *See id.* at 115-18.¹²

The court finds Defendants have made a satisfactory showing that there is insufficient evidence to establish that Joiner was exposed to furans or dioxins. Plaintiffs thus "must come forward with 'specific facts showing that there is a genuine issue for trial.'" *Matsushita Elec. Indus. Co.*, 457 U.S. at 587 (quoting Fed.R.Civ.P. 56(e)).

Plaintiffs first argue that PCBs are always contaminated with furans. In support of this position, Plaintiffs offer a number of citations to learned treatises. (*See* Plaintiffs' Brief at 14-15.)¹³ This purported evidence is unavailing. Evidence offered in connection with a motion for sum-

¹² By seeking to establish the minimum temperature for the conversion of furans from PCBs. Defendants obviously aim to show that neither transformer fires nor the baking out process would have generated a temperature high enough for such conversion. Dr. Brown testified that furans could be generated from PCBs if the PCBs were exposed to temperatures of 300 degrees centigrade for several days. (Brown Dep. at 38.) Defendants do not cite direct evidence regarding the temperatures that were reached during a transformer fire or the baking out process. Instead, they attempt to show that no one would have sought to reach furan-generating temperatures during the baking out process, because to do so would have damaged the paper insulation contained in the transformer core. (Rouse Dep. at 85 ["(I)t seems . . . very unlikely that paper would survive temperatures of 300 degrees without charring, blacking. . . ."]) As for lightning, Dr. Rouse testified that it would be "quite unlikely" for a lightning strike to cause the production of furans from PCBs. *Id.* at 84.

¹³ For example, Plaintiffs quote an article from a medical journal for the proposition that "[a]ll commercially produced PCBs are contaminated with the polychlorinated dibenzofurans." (Plaintiffs' Response at 15 [quoting Gideon Letz, *The Toxicology of Polychlorinated Biphenyls—An Overview for Clinicians*, 138 West J. Med. 534, 540 (1983)].) Plaintiffs have not provided the court a copy of this article.

mary judgment, whether contained in an affidavit or otherwise, must be admissible. Rule 56(e) ("Supporting and opposing affidavits shall be made on personal knowledge [and] shall set forth such facts as would be admissible in evidence. . . .") (emphasis added); *Aguilera v. Cook County Police & Corrections Merit Bd.*, 760 F.2d 844, 849 (7th Cir.) ("Sworn testimony is not the only basis on which summary judgment may be granted; 'the court may consider any material that would be admissible or usable at trial.' 10A Wright, Miller & Kane, Federal Practice and Procedure § 2721, at p. 40 (2d ed. 1983) (footnote omitted)."), *cert. denied*, 474 U.S. 907 (1985). The learned treatises, being hearsay, are inadmissible.¹⁴

Plaintiffs next assert that furans are created from PCBs in fire conditions. This argument ties in with Defendants' efforts to establish the minimum temperature at which furans are converted from *[sic]* PCBs. The argument is relevant because Joiner testified that some of the transformers he worked on required service because they had caught on fire. Moreover, as noted earlier the City used stadium lights to "bake out" transformer cores.

Plaintiffs again cite to learned treatises to show that furans can be generated when PCBs are exposed to fire. However, Plaintiffs also cite Dr. Schechter's affidavit to support their argument:

PCBs are very similar chemicals to dioxins and dibenzofurans, which are also very toxic synthetic chemicals. They are frequently found together. . . . We learned from Christopher Rappe and H.R. Buser, European chemists, that when PCBs burn in the presence of oxygen they form much of the more toxic

¹⁴ It is true that learned treatises are saved from exclusion as hearsay when an expert relies on them in giving his opinion. Fed.R.Evid. 803(18), yet Plaintiffs have not cited to the court expert testimony that supports the expansive proposition they advance.

dibenzofurans and some dioxins. When the chlorinated benzenes sometime found in PCB transformer fluid burn, they yield higher amounts of dioxins and lesser amounts of dibenzofurans. Dibenzofurans are usually found in PCB transformer fluids, as reported in numerous reports and at many scientific meetings. In the Binghamton, New York transformer fire, we found PCBs, dibenzofurans and dioxins in the soot and in the air after the fire.

(Schechter Aff., ¶ 19.)

The court is troubled by the fact that Dr. Schechter is a medical doctor, not a chemist like Doctors Rouse and Brown. Cf. Fed.R.Evid. 702 (A person qualifies as an expert "by knowledge, skill, experience, training, or education."). Nevertheless, even accepting Dr. Schechter's testimony that furans can be produced from PCBs at 200 degrees centigrade, Plaintiffs have not carried their burden of showing a genuine dispute on the furans issue.

It is not enough for Plaintiffs to show that furans can be created when PCBs are exposed to a certain temperature. It is also Plaintiffs' task to link that evidence to the facts of this case, i.e., to show some credible evidence that the City's transformers were exposed to a temperature hot enough to generate furans. Plaintiffs' argument in this regard is as follows:

When the transformers came into the shop, they were often still smoking from having been on fire. (Robert Joiner Deposition at 115-116). The dielectric fluid which had been on fire remained heated, smoky, and steamy. . . . During the bake out process, "[s]moke would boil off them and in the same area where we worked." (Robert Joiner Deposition at 113). . . . On occasion, the metal parts of the transformers would turn red hot.

(Plaintiffs' Brief at 22-23.) Essentially, Plaintiffs argue that because the transformers got hot, there is a genuine

dispute on the furans issue. The court disagrees; at a minimum, Plaintiffs must produce expert testimony to show that the transformer fires or baking out process produced temperatures of at least 200 degrees centigrade. Plaintiffs have not cited such evidence to the court. The court thus finds that the evidence Plaintiffs have produced is insufficient to allow a jury to determine that Joiner was exposed to furans. See *Anderson*, 477 U.S. at 249 (if evidence supporting non-moving party's claims is insufficient for a jury to return a verdict for him, or is merely colorable or not significantly probative, then moving party is entitled to summary judgment).

Defendants' straightforward argument on the dioxins issue is based on the following testimony by Doctors Rouse and Brown:

Q Can [PCDDs] be created . . . in a PCB contaminated transformer, meaning for my question, less than 1000 parts per million in mineral oil as a result of any foreseeable lightning strikes, fire, excessive heat, electrical arcing?

A There is no evidence that PCDDs are created from PCBs under any conditions.

(Rouse Dep. at 86.)

Q Do you believe there is any association between PCDD and PCB; that is, a PCB in any fashion—sunlight, aging, fire—anything that can convert PCB's to PCDD's?

A I do not believe so.

(Brown Dep. at 24.)

The court finds that this is sufficient evidence to warrant summary judgment in Defendants' favor on the dioxins issue. Thus, the burden shifts to Plaintiffs to show a genuine dispute on the existence of dioxins in the dielectric fluid at issue.

Plaintiffs' response to Defendants' argument is as follows:

"Polychlorinated dibenzo-p-dioxins are not found in commercial PCBs. However, when PCBs are mixed with other chlorinated compounds, such as the chlorobenzenes used in transformers, PCDDs can be found in the case of accidental fires and during incineration." Even Defendants' expert, Dr. Brown, affirmed that PCDD could be formed from askarel products such as Pyranol.¹⁸ (Brown Deposition at 20) It is well documented that the heating or burning of PCBs will create both the dibenzofurans and deadly dioxins. (Schechter Affidavit ¶ 16.)

In a February 5, 1981 incident in Binghamton, N.Y., with which Dr. Arnold Schechter, is personally familiar, a PCB transformer caught on fire. Thirteen years later, the building remains uninhabitable because of contamination by PCDFs and PCDDs formed in the fire. (Schechter Affidavit ¶ 16) Robert Joiner dealt with transformer fires on a regular basis.

(Plaintiffs' Brief at 16 [footnote omitted].)

Plaintiffs' argument is unavailing. The portion of the argument in quotation marks comes from a learned treatise and is thus hearsay for the reasons discussed earlier. While Dr. Brown did testify that dioxins can be generated from Pyranol, Plaintiffs have produced no evidence to show that Pyranol is the source of the PCB contamination in the City's transformers.¹⁹ Contrary to Plaintiffs' argu-

¹⁸ The court judicially notices that an askarel is "a synthetic electrically insulating fluid that is noncombustible." *Webster's Third New International Dictionary* 128 (Merriam-Webster 1986). See footnote 7, *supra*.

¹⁹ Dr. Brown's testimony reads as follows:

Q. What about PCDD's from other ingredients in commercial askarels; for example, Pyranol has—trichlorobenzene is a major constituent, about 40 percent of that; correct?

A. Yes.

[Continued]

ment, the cited portion of Schechter's affidavit contains no citations to any studies which show that dioxins can be generated from PCBs. Dr. Schechter's conclusory, sensationalistic description of his experience with a transformer fire in New York has little probative value given the evidentiary deficits in this case. Finally, even if Plaintiffs could show that dioxins are generated from PCBs in a high temperature situation, they still have failed (as the foregoing discussion shows) to demonstrate a genuine dispute that the transformers at issue here reached the requisite high temperature. For all these reasons, the court finds that Defendants are entitled to summary judgment on the issue of whether Joiner was exposed to dioxins.

PCB/SMALL CELL LUNG CANCER LINK

Defendants argue that the record contains no admissible evidence that Plaintiff Joiner's small cell lung cancer was caused by his exposure to PCB's. "When medical causation is at issue, plaintiffs must prove causation to a 'reasonable degree of medical certainty.'" *Wells v. Ortho Pharmaceutical Corp.*, 615 F.Supp. 262, 295 (N.D. Ga. 1985) (Shoob, J.) (quoting *Parrott v. Chatham County Hosp. Auth.*, 145 Ga.App. 113, 115 (1978)), *aff'd, modified in part, and remanded*, 788 F.2d 741 (11th Cir.); *cert. denied*, 479 U.S. 950 (1986.) Given this standard, resolution of Defendants' motion for summary judgment largely depends on the admissibility of certain expert testimony that Plaintiffs have presented. Since the standards governing the admission of expert scientific testimony have been the subject of a recent Su-

¹⁸ [Continued]

Q. Can PCDD be formed from the askarel mixture which included trichlorobenzenes through fire, aging, sunlight, or any other action of which you are aware of?

A. Yes. I am aware that there have been scientific reports of the conversion of chlorobenzenes to trace quantities of PCDD's at high temperatures.

(Brown Dep. at 24.)

preme Court case, it is helpful for the court at this point to review briefly how those standards have evolved.

In *Frye v. United States*, 293 F. 1013 (D.C. Cir.1923), the D.C. Circuit rejected the results of a primitive lie detector test with the following comment: "[W]hile courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs." *Id.*, 293 F. at 1014. Until 1993, the "general acceptance" test that *Frye* announced was "the dominant standard for determining the admissibility of novel scientific evidence at trial." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. —, —, 125 L.Ed.2d 469, 478 (1993). In *Daubert*, the Supreme Court discarded the *Frye* standard on the ground that the Federal Rules of Evidence had supplanted it. *Daubert*, 125 L.Ed.2d at 479.¹⁷ Specifically, the Supreme Court held that Rule 702 of the Federal Rules of Evidence, not the general acceptance test, provides the governing standard when a litigant offers expert scientific testimony.

Rule 702 provides in part as follows: "If scientific . . . knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." The Supreme Court amplified on Rule 702's requirements as follows:

¹⁷ In *United States v. Hope*, 714 F.2d 1084 (11th Cir.1983), a panel of the Eleventh Circuit noted the argument that the Federal Rules of Evidence had replaced the *Frye* standard, but found it unnecessary to resolve the issue. *Id.*, 714 F.2d at 1087 n. 3. In *United States v. Piccinonna*, 885 F.2d 1529 (11th Cir.1989), the Eleventh Circuit *en banc* appeared to endorse the use of both Rule 702 and the *Frye* standard. *Id.* 885 F.2d at 1531. *Daubert* has now settled the issue.

Faced with a proffer of expert scientific testimony . . . , the trial judge must determine at the outset, pursuant to Rule 104(a) whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.

Daubert, 125 L.Ed.2d at 482 (footnote omitted).

In one of the footnotes omitted from the foregoing passage, the Supreme Court quotes Rule 104(a). Rule 104(a) commits to the trial court the resolution of preliminary questions regarding the admissibility of evidence. The rule states that in making this determination the court "is not bound by the rules of evidence except those with respect to privileges." The standard that guides the court as it weighs the admissibility of evidence is the "preponderance of proof." *Daubert*, 125 L.Ed.2d at 482 n. 10 (citing *Bourjaily v. United States*, 483 U.S. 171, 175-76 (1987)).

Defendants make a number of arguments to show that Plaintiffs cannot demonstrate a link between PCB exposure and small cell lung cancer. The strongest of these arguments is that the opinions of Plaintiffs' experts do not fit the facts in this case because the opinions are inextricably bound up with the experts' assumption that Joiner was exposed to furans and dioxins.

As discussed above, the admissibility analysis under Rule 702 has two prongs. The second prong requires that the proffered evidence "assist the trier of fact to understand or determine a fact in issue." *Daubert*, 125 L.Ed.2d at 481. To illustrate this point, the Supreme Court commented with approval on Judge Edward R. Becker's

opinion in *United States v. Downing*, 753 F.2d 1224 (3d Cir.1985):

The consideration has been aptly described by Judge Becker as one of "fit." [*Downing*, 753 F.2d at 1242.] "Fit" is not always obvious, and scientific validity for one purpose is not necessarily scientific validity for other, unrelated purposes. . . . The study of the phases of the moon, for example, may provide valid scientific "knowledge" about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (absent creditable grounds supporting such a link), evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night. Rule 702's "helpfulness" standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.

Daubert, 125 L.Ed.2d at 481-82 (citations omitted).

Among other things, Defendants cite the following testimony in support of their "no-fit" argument:

Q. Now, tell us what opinions you have reached in this case.

A. I believe more likely than not that Mr. Joiner's lung cancer was causally linked to cigarette smoking and PCB exposure. And by PCB exposure, I'm thinking also of PCBs and dioxins and dibenzofurans and related chemicals which frequently are found together in transformer fluids.

(Schechter Dep. at 61).

Robert Joiner, by occupational history, was exposed at work, for a long period of time on a regular basis to PCBs and other transformer fluid contaminants

routinely, after fires and high heat incidents, and when there was heating during the repair process. . . . Therefore, the initiating and promoting effects of the amounts of PCBs, dioxins and dibenzofurans was certainly enough to have contributed to his lung cancer, to the best of my medical and scientific opinion.

(Schechter Aff. ¶ 21.)

Q. All right. If you would, Dr. Teitelbaum, would you simply tell us what opinions you have reached in this case?¹⁸

A. Yes. I would say I have three opinions. [First, Joiner has lung cancer.]

Secondly, it's clear that for a period of many years, Mr. Joiner worked as an industrial electrician and had exposure to various materials commonly used in the trade, including mineral oils contaminated with PCBs.

And, three, that his lung cancer was caused by or contributor to in a significant degree by the materials with which he worked.

....

Q. Have you been shown any documents that would reflect the presence of dibenzofurans, dibenzodioxins, or chlorinated benzene in any of the mineral oil on which Mr. Joiner worked on or around?

A. I don't have any documents which would answer that question. There are, so far as I can tell, no quantitative analyses that have been supplied to me that answer how much and when.

....

Q. Or if any; is that correct?

A. I don't have any documents at all. I think that one simply has to look at the likely chemistry of the situation and what's known about PCBs man-

¹⁸ Dr. Daniel Teitelbaum (M.D.) is one of Plaintiffs' experts.

ufactured in this period and assume that there was some furan present, that there may have been some dioxin present, depending on the particular fire and circumstance. There probably was some chlorinated benzene since that's almost always a contaminant.

(Teitelbaum Dep. at 28, 33-34).¹⁹

On the basis of an overwhelming body of scientific evidence which supports the position which I have taken, that cancer is a multi-factorial disease, I have outlined the elements of causation which are identifiable from Mr. Joiner's family, personal, medical and occupational history. I have specifically listed these factors in my deposition. I believe that his family history of cancer, his personal history of exposure to cigarette smoke and perhaps to silica, his medical history and his occupational history which included exposure to polychlorinated biphenyls, their contaminants, including polychlorinated [d]ibenzo-

¹⁹ Dr. Teitelbaum's testimony is also unhelpful because of his assumptions regarding the rate at which Joiner was exposed to PCBs during his work:

Q Now, do you know how often, if at all, the mineral oil was contaminated with PCBs?

A No, I don't know that. As I said, I understand that there are documents, but I don't know from what era.

Q All right.

A I would say that from the era that we're talking about, virtually all of the mineral oil would have been contaminated within the ranges that we're talking about. I think it would be unusual for it not to be contaminated at that time.

Q All right. So for purposes of your rendering your opinion, are you assuming that virtually all the mineral oil was contaminated with PCBs?

A Yes.

Q Okay.

A With concentrations between 50 and a few thousand parts per million during this era of time.

(Teitelbaum Dep. at 45-46.) As noted earlier, about one in five of the City's transformers presented a PCB risk.

furans, mineral oil, mineral spirits and other material together were a sufficient and probable cause of Mr. Joiner's lung cancer. In my opinion, PCBs were a significant contributing cause to Mr. Joiner's lung cancer.

(Teitelbaum Aff., ¶ 12.)

The foregoing testimony makes it clear that Plaintiffs' experts assumed Joiner was exposed to furans and dioxins.²⁰ Moreover, this assumption is an integral part of the foundation for the experts' opinions that PCBs contributed to Joiner's lung cancer. However, as discussed above, Plaintiffs have failed to show a genuine dispute over whether furans and dioxins were in the PCBs to which Joiner was exposed. Thus, the testimony of Plaintiffs' experts manifestly does not fit the facts of this case, and is therefore inadmissible.²¹

²⁰ The court notes the following testimony by Dr. Schecter:

Q. What information do you have about the concentrations of PCBs, furans and dioxins in the mineral oil contained in the transformers that Robert Joiner worked around?

A. We have specific data back that came by fax yesterday, and I showed you my entire file, showing that there were PCBs in some of the mineral oil. And my general knowledge that dibenzofurans and dioxins are found in PCB-containing electrical transformer oils.

(Schecter Dep. at 84.)

²¹ Dr. Robertson's testimony has no utility, for he failed to identify any specific chemicals as alleged promoters of Joiner's lung cancer:

I expect, based upon of course what further information comes to me, that is I qualify my expectation on that basis, that my —my expert opinion will be that this gentleman developed lung carcinoma at a very young age because the onset of that disease was promoted, supported, accelerated by his exposure to halogenated aromatic hydrocarbons.

(Robertson Dep. at 16.) Defendants assert that the term "halogenated aromatic hydrocarbons" describes a "broad category of chemicals." (Defendants' Brief at 15 n. 14.)

Assuming that Plaintiffs' experts had not made unfounded assumptions about furans and dioxins, Defendants still persuade the court that Plaintiffs' expert testimony would not be admissible. Defendants do this by attacking the conclusions that Plaintiffs' experts draw from the studies they cite.

Defendants initially argue that they are entitled to summary judgment because Doctors Robertson and Teitelbaum answered in the negative when asked if there was any credible evidence "as a scientific probability" that PCBs cause or promote small cell lung cancer in humans. (Robertson Dep. at 14; Teitelbaum Dep. at 110.) Stated another way, Defendants assert that they are entitled to summary judgment because there are no epidemiological studies which show that PCBs cause small cell lung cancer in humans. However,

"a cause-effect relationship need not be clearly established by animal or epidemiological studies before a doctor can testify that, in his opinion, such a relationship exists. As long as the basic methodology employed to reach such a conclusion is sound, such as use of tissue samples, standard tests, and patient examination, products liability law does not preclude recovery until a 'statistically significant' number of people have been injured or until science has had the time and resources to complete sophisticated laboratory studies of the chemical."

Wells v. Ortho Pharmaceutical Corp., 788 F.2d 741, 745 (11th Cir.)(quoting *Ferebee v. Chevron Chem. Corp.*, 736 F.2d 1529, 1535 (D.C. Cir.), cert. denied, 469 U.S. 1062 (1984)), cert. denied, 479 U.S. 950 (1986). Thus, the absence of an epidemiological study in Plaintiffs' favor does not automatically foreclose their action.

Defendants attack the experts' reliance on animal studies with more success. Dr. Robertson testified regarding two studies of infant, suckling mice upon which Doc-

tors Schecter and Teitelbaum relied. Defendants summarize Dr. Robertson's testimony as follows:

Dr. Robertson admitted that his opinion that PCBs are "promoting agents" is based on only two studies in infant, suckling mice. (Robertson Depo., at 14-15.) . . . [A]s to those two studies, Dr. Robertson admitted that (1) the lung cancer promoted in the infant mice was not identified as small cell carcinoma (Robertson Depo., at 15), (2) he did not know whether the same effect had been produced in adult mice (Robertson Depo., at 23), (3) the tumors produced were dose-dependent, (Robertson Depo., at 26), and (4) after having administered a known initiating carcinogen, the mice were dosed with 100% PCBs by either injecting it directly into the peritoneum (the body cavity containing most vital organs) or directly into the stomach (Robertson Depo., at 27-28).²²

A review of the two studies themselves reveals that [the] infant mice developed alveolgenic adenomas, not small cell carcinomas. (Robertson Depo., Exhibits 2 & 3).²³

²² Dr. Robertson testified that in one of the studies the mice were dosed with 500 milligrams of PCBs per kilogram, while in the other a range of doses (i.e., 50, 250, and 500 milligrams of PCBs per kilogram) was given. (Robertson Dep. at 26.)

²³ Defendants have not cited to the court evidence regarding the definition of "adenoma." The court judicially notices that it is "a benign tumor of a glandlike structure or of glandular origin." *Webster's Third New International Dictionary* 25 (Merriam-Webster 1986) (emphasis added). See footnote 7, *supra*. Despite the fact that an adenoma is a benign tumor, Dr. Robertson testified that the mice had developed a form of cancer:

A I know of studies, and we have identified one of them, in which PCBs promote DMN-initiated carcinoma in the lung of mice.

Q34 Is that article small cell carcinoma . . . ?

A It's not identified as such, that's correct.

(Robertson Dep. at 14-15.) Though copies of the mice studies were used as exhibits during Dr. Robertson's deposition, the ex-

(Defendants' Brief at 36.) Both Dr. Schecter and Dr. Teitelbaum relied on the mice studies in opining that PCBs promoted Joiner's lung cancer. (Schecter Dep. at 66-69; *see* Teitelbaum Dep. at 48, 78-81.)

Defendants assert that Plaintiffs' experts' reliance on the mice studies is unjustifiable because they "admittedly base their various opinions on the extrapolation of physical effects observed in laboratory test animals subjected to extremely high levels of PCBs." (Defendants' Brief at 35.) In support of this position, Defendants cite *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349 (6th Cir.1992), *cert. denied*, — U.S. —, 121 L.Ed. 2d 47 (1992), which contains the following passage:

We do not mean to intimate that animal studies lack scientific merit or power when it comes to predicting outcomes in humans. Animal studies often comprise the backbone of evidence indicating biological hazards, and their legal value has been recognized by federal courts and agencies. . . .

Here, the record's explanation of the animal studies is simply inadequate. Although the animal studies themselves may have been scientifically performed, the exact nature of these tests is explained only in general terms. The record fails to make clear why the varying doses of Bendectin or doxylamine succinate given to the rats, rabbits and *in vitro* animal cells would permit a jury to conclude that Bendectin more probably than not causes limb defects in children born to mothers who ingested the drug at pre-

hibits did not accompany the copy of the Robertson deposition that was filed with the court. Thus, the court is unable to review the studies themselves in order to clarify the confusion that exists over whether the mice in fact developed malignant tumors. However, in their brief Defendants repeatedly concede that a form of lung cancer occurred in the mice. The court thus proceeds from the standpoint that the mice did develop some type of lung cancer, but that the lung cancer was not of the small cell variety.

scribed doses during pregnancy. The analytical gap between the evidence presented and the inferences to be drawn on the ultimate issue of human birth defects is too wide. Under such circumstances, a jury should not be asked to speculate on the issue of causation.

Id., 959 F.2d at 1360-61 (citations omitted).²⁴

Defendants' argument persuades the court that Plaintiffs' experts' reliance on the mice studies is flawed for several reasons. First, there are only two studies. Second, the studies obviously used massive doses of PCBs. Finally, Dr. Teitelbaum implicitly admitted the preliminary nature of the mice studies' findings:

Q Other than the studies by Lucy Anderson [i.e., the author of the mice studies], do you know of any other animal study where lung cancer was promoted in a species other than mice?

A I don't think anybody's studied any other study. I think that now that the 1993 Anderson publication came out, I suspect you're going to see some more studies on that because now there seems to be a clean model that can be looked at.

(Teitelbaum Dep. at 87.) The court thus finds that Defendants have sufficiently called into question the validity of Plaintiffs' experts' reliance on the mice studies. Therefore, the burden shifts to Plaintiffs to demonstrate by a preponderance of proof that their experts' opinions are admissible.

Regarding the mice studies, Plaintiffs have chosen to proceed as if the only issue is whether animal studies can ever be a proper foundation for an expert's opinion. Plaintiffs assume Defendants' argument is that experts should never rely on animal studies as the basis for an expert

²⁴ *Turpin* predates *Daubert*. However, in *Daubert* the Supreme Court referred to *Turpin* with approval. *See Daubert*, 509 U.S. at —, 113 S.Ct. at 2797-99, 125 L.Ed.2d at 484-85.

opinion. However, read as a whole, that is not Defendants' argument. (See Defendants' Brief at 32, 33 ["Valid scientific reasons exist for scientists to exercise extreme caution when interpreting animal studies"; "[t]his is not to say that animal studies have no legitimate role in scientific research, but it is certainly a limited one."].) Plaintiffs' argument addresses the question of reliance on animal studies in general, not the deficiencies that Defendants have highlighted in the experts' reliance on the animal studies at issue here. Plaintiffs' argument, being unresponsive to the issue at hand, does not persuade the court to change its finding that Plaintiffs' experts erred in relying on the mice studies to opine that PCBs caused Joiner's lung cancer "to a 'reasonable degree of medical certainty.'" *Wells*, 615 F.Supp. at 295.

Regarding epidemiological studies, Plaintiffs take issue with Defendants' claim that no such studies support Plaintiffs' position, for they assert that their experts "identify several epidemiological studies in support of their opinions." (Plaintiffs' Brief at 46 [footnote omitted].)²⁶

²⁶ Teitelbaum testified that he was aware of no studies which show that PCBs cause, contribute, or promote small cell lung cancer in humans. (Teitelbaum Dep. at 110-11.) Dr. Schecter confirmed that controlled studies which showed PCB to be a cancer promoter were done only on animals:

Q. Again, your opinion that PCBs, dioxins and furans operate as promoters is based upon studies of laboratory animals only, is that true?

A. The studies which tell us that PCBs, dioxins and dibenzofurans are promoters of cancer were developed through laboratory animals and we have belief that they are relevant to humans. We test them on animals. We believe that's relevant to humans.

Q. Your opinion about PCBs, dioxins and furans being promoters is based upon studies of animals?

A. Yes. And my reason for believing this is relevant to human studies is because all government agencies concerned with health believe that this is the case and that we can usually predetect, because humans also are in the animal king-

Plaintiffs assert that the studies their experts cite "demonstrate a positive correlation between exposure to PCB and lung cancer." (Plaintiffs' Brief at 11.) However, in every case Defendants show that the studies are either equivocal or not helpful to Plaintiffs.

Plaintiffs offer selected quotes from Bertazzi, et al., *Cancer Mortality of Capacitor Manufacturing Workers*, 11 Am.J.Indus.Med. 165 (1987), in support of their position. (See Plaintiffs' Brief at 11.)²⁷ Defendants note, however, that the Bertazzi study contains the following conclusion:

There were apparently no grounds for associating lung cancer deaths (although increased above expectations) and exposure in the plant. The numbers were small, the value of the risk estimate was not statistically significant, and such risk had never been suggested before.

(Defendants' Reply at 7 [quoting Bertazzi, *supra*, at 172].)²⁷

Plaintiffs offer selected quotes from Judith A. Zack & David C. Musch, *Mortality of PCB Workers at the Mon-*

dom. Humans cells are nuclei, cytoplasm, mitochondria, endoplasmic reticulum and respond in similar fashion.

(Schecter Dep. at 68-69.)

²⁶ One such quote is that "[s]tudies of the metabolic fate [sic; rate?] of these substances sustain the *plausibility* of a carcinogenic action" (emphasis added). The mere plausibility of carcinogenic action does not establish causation. See *Turpin*, 959 F.2d at 1360 ("[The plaintiffs' experts] testify that the animal studies show that Bendectin is 'capable of causing,' 'could cause' or its effects are 'consistent with causing' birth defects, not that it probably causes birth defects in general or that it did in this case. In short, they testify to a possibility rather than a probability.").

²⁷ With one exception, neither party has provided the court with a copy of the studies cited in the briefs. (The one exception is Plaintiffs' provision of the Zack & Musch study discussed below.) Thus, the court for the most part has had to rely on the excerpts from the studies that the parties have provided in their briefs.

santo Plant in Sauget, Illinois (1979), an unpublished study that Monsanto funded. (Plaintiffs' Brief at 12-13.) Defendants note that in a later version of the study (which they assert was prepared with a view toward publication) the study's authors specifically stated that "[w]hile many of the cancer-specific SMRs exceed 100, none are statistically significant." (Defendants Reply, Ex. C at 7.)²⁸ At least with regard to lung cancer, the original study that Plaintiffs cite essentially contains the same statement, albeit in a longer fashion:

For all males, there were 30 deaths observed and 22.88 expected (Table 4). . . . The SMR for lung cancer was high at 278. The only statistically significant difference seen in this table is seen for diseases of the circulatory system, exclusive of arteriosclerotic disease. Nine deaths were observed with 3.98 expected, yielding a SMR of 226. Table 5 shows the overall SMR remains high for white males at 133. . . . There were 3 deaths observed from lung cancer with 0.94 expected, yielding a SMR of 319. For the category of circulatory disease, exclusive of arteriosclerotic disease, the SMR was 526 with 7 observed and 1.83 expected deaths. This difference was the only one of statistical significance in this table.

Plaintiffs assert that "[a]nother study of interest is a study of PCB exposed workers in a Norwegian cable manufacturing company. A statistically significant excess of deaths from lung cancer was observed. Ten deaths from lung cancer were observed when only 3.9 were expected." (Plaintiffs' Brief at 13.) Defendants note that the study "never mentions PCBs and does not involve 'PCB-exposed workers.' It reports a statistically significant excess of cases of lung cancer in a small cohort of

²⁸ "Ratios of observed to expected number of deaths [are] expressed as standardized mortality ratios (SMRs)." (Defendants' Reply, Ex. C at 6.)

cable workers exposed to mineral oil, whose exposure was also confounded by exposure to asbestos and cigarette smoke." (Defendants' Reply at 8.) The study concluded as follows:

The present study has shown a statistically significant excess of cases of lung cancer in a small cohort of oil exposed cable workers. This result cannot be accounted for by excess smoking alone and exposure to non-severely refined, low viscosity, and high viscosity oils must be considered as an important causative factor. For reasons discussed above the results presented here are not necessarily relevant to all other types of mineral oils. Further follow up of this population and studies of other groups with well defined exposure to oils are needed before any firm conclusions may be drawn regarding the carcinogenicity of mineral oil products to the human lung.

(Defendants' Reply at 8 n. 8 [quoting Ronneberg, et al., *Mortality and Incidence of Cancer Among Oil Exposed Workers in a Norwegian Cable Manufacturing Company Part 2 Mortality and Cancer Incidence in 1953-84*, 45 *British J. Indus. Med.* 595, 601 (1988)].)

The last study Plaintiffs cite is Ikeda, et al., *A Cohort Study on Mortality of Yusho Patients—A Preliminary Report*, 78 *Fukuoka Acta Med.* 297 (1987), which Plaintiffs assert was summarized in a publication entitled *World Health Organization's International Programme on Chemical Safety, Polychlorinated Biphenyls and Terphenyls* 449 (2d Ed.1993). The "Yusho" incident involved Japanese people who were accidentally exposed to toxic substances. The report states that "[a] statistically significant excess mortality was seen for malignant neoplasms, cancer of the liver and cancer of the lung, trachea, and bronchi in males." (Plaintiffs' Brief at 13.)

Defendants respond to this study as follows:

The [Ikeda] report was published in English by Kuratsune, et al., "Analysis of Deaths Seen Among Pa-

tients With Yusho—A Preliminary Report,” *Chemosphere*, Vol. 16, Nos. 8/9, pp. 2085-2088 (1987). As indicated by the title, it is a “preliminary report” of an “analysis of deaths,” *not* an epidemiological study. No regression analysis was done and the authors did not control for cigarette smoking, asbestos exposure, or other causes of cancer. Most significant, however, is the fact that, although the deaths were observed in Yusho patients, the authors *did not examine if the observed excess risks might be related to the intake of toxic rice oil*. Kuratsune, p. 2087.

(Defendants’ Brief at 10 [emphasis in original].) Dr. Schechter’s testimony reveals why the omission regarding toxic rice oil is so significant:

A. . . . We have a voluminous data on human response in Yusho and Yuchem to humans exposed to PCBs, dibenzofurans and dioxins.

Q. Now, in those two incidents, the Yusho and Yuchem, in both of those [incidents], what was the concentration of PCBs, was it a 65 percent concentration, was it 650 parts per million Aroclor or some equivalent?

A. I don’t remember what it was. *It was PCB and dibenzofuran and dioxin contamination of rice oil which was used to cook food*. I don’t think anyone can be certain of what the intake was.

(Schechter Dep. at 91 [emphasis added].) Finally, Dr. Teitelbaum did not find much significance in the Yusho report:

Q. . . . What, if any, epidemiological studies have you reviewed in reaching your opinion?

A. . . .

. . . You’ve got Kuratsune’s studies from Japan. You’ve got a few cases of lung cancer there. They’re not very convincing, as the Japanese lifestyle is different. There’s—it’s, again, suggestive but not convincing.

(Teitelbaum Dep. at 89-90.) The limitations in the Yusho study (e.g., failure to investigate exposure to other potential carcinogens), the fact that the persons studied were exposed to furans and dioxins, and the fact that one of Plaintiffs’ own experts has a low opinion regarding the relevance of the Yusho study together combine to convince the court that the study has no utility for Plaintiffs’ purposes.

In *Daubert*, the Supreme Court noted that under Rule 702 “[t]he subject of an expert’s testimony must be ‘scientific . . . knowledge.’ The adjective ‘scientific’ implies a grounding in the methods and procedures of science. Similarly, the word ‘knowledge’ connotes more than subjective belief or unsupported speculation.” *Id.*, 125 L.Ed.2d at 480-81 (ellipsis in original) (footnote omitted). The court need not address whether the studies that Plaintiffs’ experts rely upon were conducted in a scientific manner, for the studies simply do not support the experts’ position that PCBs *more probably than not* promoted Joiner’s lung cancer. That is, the court is not persuaded by a preponderance of proof that the studies support the “knowledge” the experts purport to have, i.e., that PCBs, “to a ‘reasonable degree of medical certainty,’” *Wells*, 615 F.Supp. at 295, promote small cell lung cancer in humans). See *Turpin*, 959 F.2d at 1360 (“The analytical gap between the evidence presented and the inferences to be drawn on the ultimate issue of human birth defects is too wide.”); *cf. Wells*, 788 F.2d at 745 (“[T]he basic methodology employed to reach . . . a conclusion [must be] sound.”). The court is persuaded that the opinions of Plaintiffs’ experts do not rise above “subjective belief or unsupported speculation.”²⁹

²⁹ Summary judgment for Defendants would be in order even if the testimony of Plaintiffs’ experts were admissible, for the court believes that no reasonable juror could find that PCBs caused Joiner’s lung cancer given the flawed nature of Plaintiffs’ experts’ opinions. *Cf. Elkins v. Richardson-Merrell, Inc.*, 8 F.3d 1068, 1071 (6th Cir.1993) (“We construe *Turpin* to treat the plaintiff’s ex-

Plaintiffs' experts opinions that PCBs promoted Joiner's lung cancer are inextricably bound up with their unfounded assumption that Joiner was exposed to furans and dioxins. Moreover, the court finds that Plaintiffs have failed to show by a preponderance of proof that their experts' opinions regarding the PCB/lung cancer link are admissible under the standards set out in Rule 702 and explicated in *Daubert*. Therefore, Defendants are entitled to summary judgment on all of Plaintiffs' claims.

CONCLUSION

Accordingly, Defendants' joint motion for summary judgment [#46-1] is GRANTED. Defendants' request for oral argument on their motion for summary judgment [#47-1] and Plaintiffs' request for oral argument on Defendants' motion for summary judgment [#55-1] are DENIED. GE's motion requesting supplemental brief [#67-1] is DENIED. The Clerk is DIRECTED to enter judgment in Defendants' favor on all of Plaintiffs' claims.

SO ORDERED, this 16 day of September, 1994.

/s/ Orinda D. Evans
ORINDA D. EVANS
UNITED STATES DISTRICT JUDGE

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BY L.D.T. CLERK
DEPUTY CLERK

pert opinion indicating a basis of support for the plaintiff's theories in animal studies to be admissible but 'simply inadequate . . . [to] permit a jury to conclude that Bendectin more probably than not causes limb defects.' *Id.* at 1360.") (ellipsis and brackets in original).

APPENDIX D

[Filed Sept. 20, 1994]

UNITED STATES DISTRICT COURT NORTHERN DISTRICT OF GEORGIA ATLANTA DIVISION

Civil Action No. 1:92-cv-2137-ODE

ROBERT K. JOINER, KAREN P. JOINER
vs. *Plaintiffs,*

GENERAL ELECTRIC COMPANY,
WESTINGHOUSE ELECTRIC CORP.,
MONSANTO COMPANY
Defendants.

JUDGMENT

This action having come before the court, Orinda D. Evans, United States District Judge, for consideration of the action, and the court having decided same, it is

Ordered and Adjudged that the plaintiffs, Robert K. and Karen P. Joiner, take nothing, that the action be dismissed, and that the defendant, General Electric Company, Westinghouse Electric Corporation, Monsanto Company, recover from the plaintiffs the costs of this action.

Dated at Atlanta, Georgia, this 16th day of September, 1994.

LUTHER D. THOMAS
Clerk

By: /s/ Diane Taylor
DIANE TAYLOR
Deputy Clerk

APPENDIX E**Federal Rules of Evidence****Rule 104****Preliminary Questions**

(a) Questions of Admissibility Generally. Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b). In making its determination it is not bound by the rules of evidence except those with respect to privileges.

(b) Relevancy conditioned on fact. When the relevancy of evidence depends upon the fulfillment of a condition of fact, the court shall admit it upon, or subject to, the introduction of evidence sufficient to support a finding of the fulfillment of the condition.

(c) Hearing of jury. Hearings on the admissibility of confessions shall in all cases be conducted out of the hearing of the jury. Hearings on other preliminary matters shall be so conducted when the interests of justice require, or when an accused is a witness and so requests.

(d) Testimony by accused. The accused does not, by testifying upon a preliminary matter, become subject to cross-examination as to other issues in the case.

(e) Weight and credibility. This rule does not limit the right of a party to introduce before the jury evidence relevant to weight or credibility.

* * * *

Rule 702**Testimony by Experts**

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an

expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

* * * *

Rule 706**Court Appointed Experts**

(a) Appointment. The court may on its own motion or on the motion of any party enter an order to show cause why expert witnesses should not be appointed, and may request the parties to submit nominations. The court may appoint any expert witnesses agreed upon by the parties, and may appoint expert witnesses of its own selection. An expert witness shall not be appointed by the court unless the witness consents to act. A witness so appointed shall be informed of the witness' duties by the court in writing, a copy of which shall be filed with the clerk, or at a conference in which the parties shall have opportunity to participate. A witness so appointed shall advise the parties of the witness' findings, if any; the witness' deposition may be taken by any party; and the witness may be called to testify by the court or any party. The witness shall be subject to cross-examination by each party, including a party calling the witness.

(b) Compensation. Expert witnesses so appointed are entitled to reasonable compensation in whatever sum the court may allow. The compensation thus fixed is payable from funds which may be provided by law in criminal cases and civil actions and proceedings involving just compensation under the fifth amendment. In other civil actions and proceedings the compensation shall be paid by the parties in such proportion and at such time as the court directs, and thereafter charged in like manner as other costs.

(c) Disclosure of appointment. In the exercise of its discretion, the court may authorize disclosure to the jury of the fact that the court appointed the expert witness.

(d) Parties' experts of own selection. Nothing in this rule limits the parties in calling expert witnesses of their own selection.